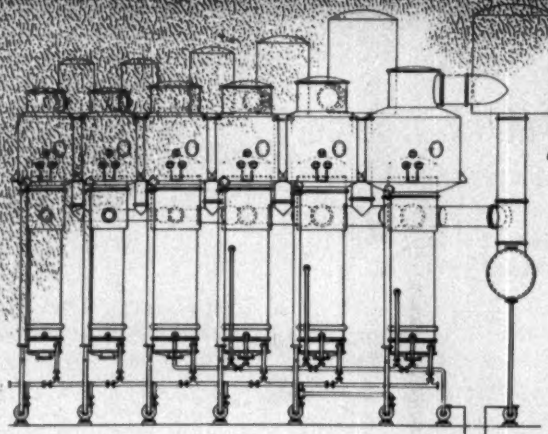
Paper

JUNE 22, 1951

WHAT EFFECT DO VARIOUS INORGANIC SALTS HAVE ON THE WATER USED FOR PAPERMAKING?
. . . See page 19.



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Efficient catchalls and vapor heads designed for low, safe vapor velocities enable you to operate up to and over design capacity without entrainment losses. This is one of the many advantages offered by evaporators designed and fabricated by Goslin-Birmingham Manufacturing Company.

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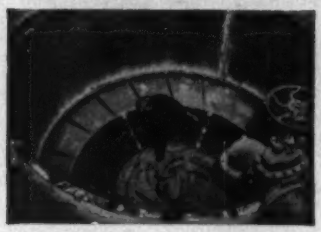
NEW YORK: Goslin-Birmingham, 350 Madison Ave. CHICAGO: F. M. deBeers and Associates, 70 N. Wacker

3 metal failure problems . . . solved by the use of Nickel and Nickel Alloys



ABRASION and corrosion were minimized in this hydrapulper by using Lukens Nickel-Clad Steel. Machine is specially designed to replace less efficient, more bulky breaker beaters in paper and board mills. It combines the protection of nickel with the economy of steel. Fabricated for Dilts Machine Works Division of Black-Clawson Co., Fulton, N. Y.

Have you a metal failure problem?

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32 pages of practical information on the toughest kind of metal failure problems

This new 32-page Inco bulletin is designed to show you how others have found practical solutions to their material selection problems—*solutions that you can use to advantage.*

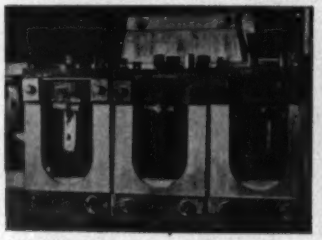
The bulletin discusses various sliming, corrosion and abrasion problems, and explains how tough, long-lasting, corrosion-resistant nickel and nickel alloys have been used to solve them.

These are the problems discussed: Chemical Pulping Equipment and Digesters • Brown Stock Washers—Thickeners — Filters • Screening • Stock and White Water Lines • Bleached Pulp Thickeners and Washers • Sizing, Fillers, and Board Machines • Paper Machines • Paper Machine Rolls • Recovery Processes • Pumping Equipment.

The bulletin is simply written and contains 64 illustrations of units and actual installations. It also contains 19 tables of valuable technical data which were compiled by Inco's engineering research staff.

Write to Inco today for your free copy of "Practical Solutions for metal problems . . . in PULP and PAPER MILLS." And remember, if you need further information on materials testing, selection, or fabrication, our Technical Service and Corrosion Engineering staffs are ready to help you at any time.

The International Nickel Company, Inc.
67 Wall Street, New York 5, N. Y.



FATIGUE from both vibration and corrosive action is a problem with suction box and shake springs. These were made from age-hardened Duranickel strip by Rice Barton Corp., Worcester, Mass. This new alloy has high mechanical properties and elasticity modulus, and ably withstands vibration and corrosion.

PITTING and rust blemishes were eliminated on this steel waxed-paper chilling roll by applying a 1/16th" Monel cover. Efficiency was stepped up so that machine speed could be increased by one-third. Photo courtesy of Minerva Wax Paper Co., Minerva, Ohio.

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piping upkeep *costs more* now!

Crane Alloy Cast Iron Gate Valve, 18-8 Mo. trimmed. 200 Pounds W.O.G.

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O.S. & Y. design keeps stem threads from contact with line fluid; straight through ports assure unrestricted flow, minimize turbulence and corrosive action. Extra-long guides keep disc travel true.

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"All motors are NOT alike!"

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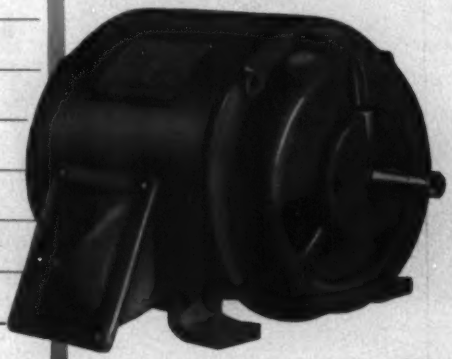
ONLY ONE MOTOR HAS ALL THESE DESIGN FEATURES:	DESIGN A Prelubricated cartridge—bearing mounted in bracket	DESIGN B Open bearing mounted in bracket	RELIANCE Double-shielded, prelubricated bearing mounted in bearing cap
Bearing sealed from dirt and other foreign material	YES	NO	YES
Enclosed bearing housing	NO	YES	YES
Bearing can be re-lubricated without being disassembled	NO	YES	YES
Motor can be re-greased without removing drain plug	**	NO	YES
Automatic grease relief to suit any lubrication system	NO	NO	YES
Protection against grease entering windings	YES	*YES	YES
Balls free of direct pressure during lubrication	YES	NO	YES
Bearing can be removed without danger of distortion	NO	NO	YES
Reservoir to protect against under-greasing	NO	YES	YES
Standard commercial ball bearings	YES	YES	YES
Larger grease reserve than provided with any standard bearing	NO	YES	YES
Grease supply free of churning action	NO	NO	YES
Measuring unnecessary to prevent overgreasing	NO	*YES	YES
Unnecessary to grease equally at each side of ball race	NO	YES	YES
Lubricant is retained in ball race	YES	NO	YES

** Means is not provided for relubrication of assembled motor.
*YES, if drain plug is removed.

The Reliance Pre-lubricated Bearing Design has all of the features vital to maximum motor life. Check these points in the chart at left. The performance of Reliance PRECISION-BUILT Motors in all industries and under all operating conditions has proved their value in long-wearing, trouble-free bearing design.

In most applications, Reliance PRECISION-BUILT Motors operate satisfactorily for years without relubrication. Where it is a practice to grease regularly or where operating conditions make it desirable . . . it is impossible to overgrease a Reliance Motor. Write for *new* Bulletin B-2201 for the "inside story" of the Reliance Pre-lubricated Bearing Design.

Reliance PRECISION-BUILT A-c. Motors from ¼ to 300 Hp.



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"All Motors are NOT Alike" • 1899 Ivanhoe Road, Cleveland 10, Ohio

Paper TRADE JOURNAL

VOL. 132 **JUNE 22, 1951** **No. 25**

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NEXT WEEK

For a story on efficient utilization of raw materials to obtain the maximum yield of product, per unit of wood, read "Bathurst Conservation Measures" by E. P. McGinn.

REMEMBER THESE DATES

JUNE 24-28: American Pulp & Paper Mill Supts. Ass'n. National Convention, to be held at the Multnomah Hotel, Portland, Oregon.

JUNE 27-30: Empire State TAPPI, meeting at the White Face Inn, Lake Placid, N. Y.

JULY 24: American Pulp & Paper Mill Superintendents Assn., Michigan Division, Annual Field and Sport Day, at the Kalamazoo Country Club, Kalamazoo, Mich.

SEPT. 6-8: American Pulp & Paper Mill Superintendents Assn., New York, Canadian Division, meeting at Saranac Inn, Saranac, N. Y.

SEPT. 14-15: American Pulp & Paper Mill Superintendents Assn., Northeastern Division, meeting at Poland Spring House, Poland Spring, Maine.

SEPT. 14-15: American Pulp & Paper Mill Superintendents Assn., Northwestern Division meeting at Northern Holiday Resort, Marenesco, Mich.

SEPT. 16-19: American Institute of Chemical Engineers, Regional Meeting, French Lick, Ind.

SEPT. 20: American Pulp & Paper Mill Superintendents Assn., Michigan Division, Fall Meeting at Hotel Harris, Kalamazoo, Mich.

OCT. 10-12: American Pulp & Paper Mill Superintendents Assn., Southern and Southeastern Div'n., George Washington Hotel, Jacksonville, Fla.

Oct. 29-31: National Foreign Trade Convention, Waldorf Astoria, New York City.

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1. Black-Clawson spiral bevel and hypoid gear drives provide trouble-free operation as well as a clean appearance to the drive side of the paper machine.
2. Rugged, compact, vibrationless and automatically lubricated.
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In these four elements, mills are offered drives of outstanding performance characteristics.

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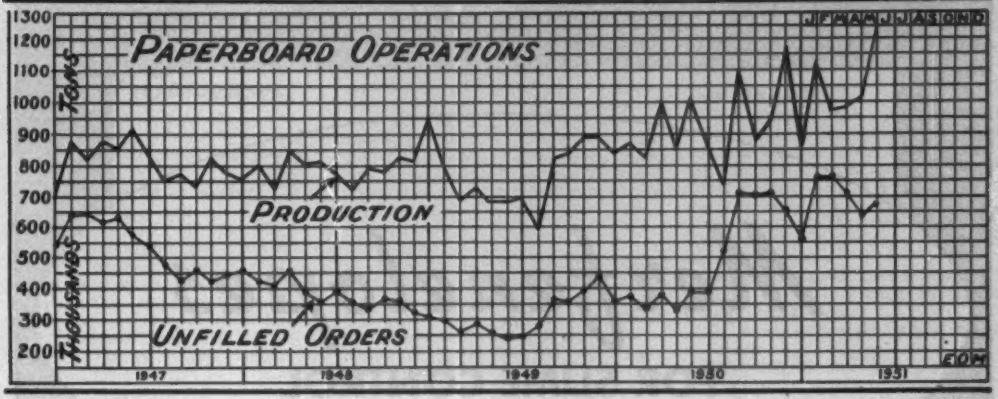

Weekly Brief of Important Figures

Source	Production	WEEK ENDING June 9, '51	May 12, '51	June 10, '50
APPA	Paper Production Percent Capacity[3]	104.2	102.3	96.4
	Unbl. Kraft Paper Production Percent	99.7	96.1	96.4
NPA	Paperboard Operating Ratio Percent Inch Hours	102	104	94
		Apr. 1951	**Mar. 1951z**	**Apr. 1950**
APPA	Paper Production[4] (Except Newsprint and Building Papers) ....Tons	831,500	911,574	774,000
	New Orders ....Tons	857,000	959,757	779,500
	Unfilled Orders ....Tons	964,636	932,996	543,100
	Shipments ....Tons	824,000	911,448	768,000
		[4]May 1951	**Apr. 1951**	**May 1950**
NPA	Paperboard Production ....Tons	1,251,633	1,006,972	934,600
	New Orders ....Tons	1,264,120	956,085	964,000
	Unfilled Orders ....Tons	658,722	646,878	395,500
	Our Customers Activities Index[1]	**Latest Mo.[6]**	**Previous Mo.[6]**	**Year Ago[6]**
FRS	Manufactures Total Index	230	228	191
	Durable Mfg. Index	274	268	210
	Nondurable Mfg. Index	194	195	177
	Chemical Products Index	294	291	250
	Mfg. Food Products Index	149	148	148
	Printing and Publishing Index	178	175	172
ODC	Magazine Advg.-Printer's Ink Index	343	344	328
	Retail Sales Combined Adjusted Index	342.9	356.6	308.1
	Drug Index	240.3	244.1	221.3
	General Merchandise Group Index	318.4	347.3	291.8
	Grocery and Combination Index	432.7	427.6	377.3
	Prices Index			
BLS	Consumers Price Index[1]	184.5	183.8	168.4
	Wholesale all Commodities[3]	184.0	183.6	152.7
	Wholesale Foods[3]	186.6	187.6	155.5
	Commodities other than Farm Products and Foods[3]	172.4	171.8	146.1
	Wholesale Pulp and Paper[6]	196.3	196.5	155.5
	Purchasing Power of Dollar, Consumers Prices[1]	54.2	54.4	59.4
	General Activity Index			
FRS	Mfg. Production-Worker Payroll	429.4	423.7	333.5
	Unemployment Compensation Initial Claims (M)	729	770	1,294
	Miscellaneous Carloadings–Thousands of Cars	1,373	1,498	1,688
	Electric Output (Million KW hr.)	36,172	33,102	31,864
PTJ	Average 32 P & P Common Stocks as of June 15	$37.77	$38.47	$34.58

[1] 1935-39=100 Unadjusted Index
[2] 1926=100
[3] New 6-7 day basis.
[4] For Five Weeks.
[5] For details see APPA Monthly Statistical Summary—April 1951 Estimated Figures
[6] Latest Month Available on Request
z Revised figures.

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Cleans Pipes
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R. T. VANDERBILT CO., INC.
230 Park Avenue, New York City

Paper TRADE JOURNAL

TRENDS

Office of the Paper Trade Journal, Wednesday, June 20, 1951.

How Can They Be So Stupid?

In what may well be the prime blunder of its lifetime, the Office of Defense Mobilization last week scrambled the much-tried patience of the Canadian newsprint industry and breached the long-time harmony between us and our northern friends. The ill-advised blast also placed in jeopardy the price and volume of Canadian market pulps to U. S. mills.

The Newsprint Price Lift

High-pressured by newspaper publishers who say their existence is threatened by the $10 rise in newsprint price set for July 1 by most Canadian mills, Michael V. DiSalle, the Price Administrator said he is considering naming the price which users can pay for the Canadian product. (The price probably will be lower than the new July 1 figure of $116—contract level Atlantic ports.) A decision on the matter awaits the outcome of Mr. DiSalle's conferences with Canadian Government officials.

Though concern over world inflation and its effect on the cost of defense planning have brought Economic Stabilizer Eric Johnston and Defense Mobilization Administrator Charles E. Wilson into the fray, the threat to curtail armament orders to Canada, as well as impose a ceiling on the newsprint price, drew a retort from External Affairs Secretary Lester B. Pearson that while Canada is anxious to support U. S. leadership to the free world, "she is not willing to be an echo of somebody else's voice".

Also reported from Ottawa's press is the rebuff that: "If the Americans try to slap on price control to block the increase, then it may be that Canadian producers will have to look to other markets for their newsprint".

Mr. Fowler's Defense

Defense of Canada's action came from R. M. Fowler, director of Pulp and Paper for the Canadian Government, is a letter to Mr. DiSalle.

A thorough study of the situation was made before the first newsprint rise was approved, Mr. Fowler said, and the facts on which the Canadian Government's decision were based were:

1. The pulp content of a ton of newsprint could be sold in the U.S. for more than the newsprint itself, without any provision for finishing or packaging costs.
2. Newsprint depends on the same raw material—pulpwood—as other pulp and paper products. Since the termination of World War II price controls, newsprint prices in the U.S. had advanced 26.2 percent. By comparison, since the end of controls in the U.S., book paper prices have advanced 54.3 percent; kraft wrapping papers, 63.1 percent; paperboard, 91.2 percent; and tissue papers, 93.4 percent. If the price of newsprint had risen since decontrol as much as the U.S. Government pulp and paper index, the newsprint price would now be $143 per ton. If it had risen as much as the weighted average increase shown by the four named major grades, the price would now be $145 a ton.
3. Newsprint has not apparently been attractive to new risk capital. Since the last war, there have been 10 pulp and paper mills constructed or rebuilt in Canada, and not one of them is producing newsprint. Together these mills consume annually about 1,250,000 cords of pulpwood, which would be sufficient to produce more than 1,000,000 tons of newsprint. Had even a third of this new capacity gone into newsprint, it would have been sufficient to have met all apparent shortages in North America and to have relieved most of the serious situations of newsprint shortage throughout the world.
4. Despite the fact that newsprint supply for the U.S. in 1951 will reach a new record of almost 6,000,000 tons, there is still demand in excess of supply. This 1951 total compares with 3,480,000 tons in 1945, which was the last full year of Government rationing. This is an increase in supply of more than 2,500,000 tons, or 72 percent in a period of six years. Most of this increase came from Canada, whose exports to the U.S. rose from 2,666,000 tons in 1945 to an estimated 4,775,000 tons in 1951—an increase of more than 70 percent.

Other Canadian Reactions

Many more cost factors pertaining to paper production are available for study than those presented in Mr. Fowler's moderate and well-mannered reply. Involved is not only the world price for newsprint but that for unbleached sulfite pulps produced by these same mills and needed by U.S. consumers, and reportedly named in the forthcoming woodpulp pricing order at a much lower figure than that allowed for overseas grades.

The newsprint issue has fanned into a blaze the collective smoulder resentment of Canadian mills which had expanded their sulfite output during World War II to meet U.S. needs, but were left holding the bag during the 1949 market slump. Why, it is asked, should we send our unbleached sulfites to the U.S. mills at a price so far below the Scandinavian level when in 1949 we lost our U.S. market to these same producers because their price was so much lower than ours!

Thus at a time when consuming mills are set to lose Swedish tonnages for the third quarter, for price considerations; when leading U.S. integrated mills are bargaining with their customers converters to return hard white cuttings "at a fair price" and thus cutting short the supply for regular non-integrated consumers; the Canadian volume for U.S. mills also is endangered.

"Lest We Forget"*

None expects that defense officials can in their lifetime become experts in the ramifications of the North American pulp and paper industry. But when ODM needs the paper we make from the pulp we get from the Canadians, it is well that, in the words of another Canadian, we shake ourselves down into our britches.

Might we not also take to heart the warning Rudyard Kipling wrote for another world-power:

"If drunk with sight of power, we loose
Wild tongues that have not Thee in awe . . . .
Lord, God of Hosts, be with us yet,
Lest we forget, lest we forget."

Materials

Twines.— Effective immediately, and under the terms of CPR 22, soft fiber twines were advanced by a major producer approximately 6 cents a pound. The increases are required, it is stated, "to partially offset" substantial increases in raw material costs since January 26, 1951.

Sulfur.— Italian experts express confidence that Sicilian mines can be developed sufficiently to meet the proposed schedule of 300,000 tons for 1951. Output during 1950 for all Italian industry was about 200,000 tons, much of which came from Sicily.

Backwardness of the Sicilian mines which has been blamed on absentee ownership is expected to be remedied by entrance of Italy's Montecatini Chemical Company into production management. New prospecting areas will be developed and the present mines more efficiently worked. The Italian Government also is reported to be setting aside 950 million lira for sulfur exploration; 200 million lira in counterpart funds has been approved by ECA for various temporary measure of production expansion; another 9 billion lira is to be approved for construction in mining areas; and 4 billion for machinery purchases. Also it is reported that one million pounds sterling has been approved for purchases of British sulfur production equipment, and $300,000 for U.S. equipment.

Italy's production goal of 500,000 tons for 1954 is a rise of 150 percent, sufficient to fill about half of the needs of western Europe.

—E. P. N.

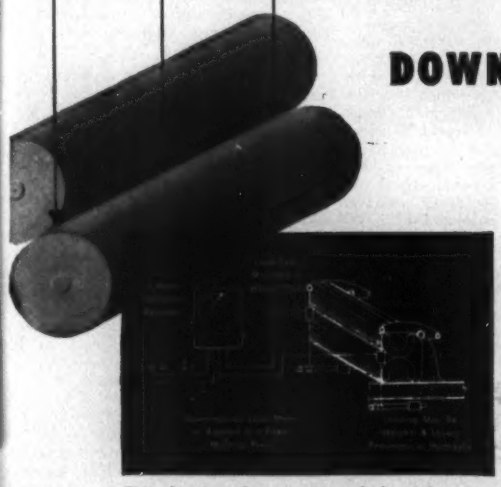
* "The Recessional" by Rudyard Kipling.

Paperboard Production (Tons)*

	June 9 1951	June 2 1951	June 10 1950
Production	244,690	243,835	214,497
New Orders	283,122	266,566	220,548
Unfilled Orders	698,726	658,723	400,731

* Source: NPA.

-NIP pressures are *ACCURATELY* measured by the DOWNINGTOWN LOAD METER



This drawing shows points which might cause inaccurate load readings are by-passed by the Downingtown control system.

Most ordinary gauges used to measure the load on a sheet at various pressure points, fail to deliver an accurate measurement because the readings are influenced by . . .

pin friction
knife edge friction
eccentric and misaligned rolls
piston packing and gland friction
piston leakage and other factors

The Downingtown Load Meter exactly measures the load at each end of the rolls, *directly*. Thus, accurate loading across the entire roll is assured with proper crowning, and pressure is controlled as required by the sheet made.

The Downingtown Load Meter has no moving parts to wear, does not change calibration with use nor normal temperature variations. It is simple, inexpensive and easy to install.

Write for complete information about the Downingtown Load Meter developed expressly for the paper and board making industry.

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Pacific Coast Representative: John V. Roslund, Pacific Bldg., Portland 4, Oregon

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News of the Week

Paper TRADE JOURNAL

COLUMBINE GETS EXTENSION

WASHINGTON, D. C. — The Columbine Development company on June 12 was granted a ten-month extension in its battle to finance a multi-million-dollar pulp paper mill on Colorado's western slope.

The forest service has granted the Colorado company until May 1, 1952, to secure financial backing for the project.

Action by the forest service announced by Forest Service Chief Lyle F. Watts, put at rest fears that the firm's plans might collapse July 1.

MAKES TIMBER SURVEY

John Beach, member of the Western Land Management Division for Rayonier, Inc., has gone to Juneau to conduct a pulp timber survey in Southeast Alaska for his company.

Mr. Beach said he went at invitation of B. Frank, Heintzleman, regional forester of the U. S. Forest Service to make a preliminary study of pulp timber. He flew over Juneau from the south and of Admiralty Island to Sitka on a survey. He will spend two weeks in Juneau and then will go to Ketchikan on the same mission. He will probably cover the Wrangell-Petersburg area from the south end of the division.

MEAD SELLS MANISTIQUE LIGHT

MANISTIQUE, Mich. — Negotiations have been completed with the Mead Corp., Dayton, Ohio, for the purchase of the Manistique Light and Power Co., by the Edison Sault Electric Co., of Sault Ste. Marie, Mich., subject to approval by the Michigan Public Service commission, it was announced recently by George W. Baldwin, Edison Sault president.

BRADFORD BUYS PLANT

HOLLAND, Mich. — The land and building of the Baker Furniture Co. was purchased recently by the Bradford Paper Co., of Chicago, Ill., to be converted for the production of paper products.

PAPER PROBLEMS HEARD

Paper problems in modern high speed printing were described by Ray Stewart and W. L. Hepburn, technical experts of R. R. Donnelly & Sons of Chicago, at a dinner meet of the Supervisors' club of the Escanaba Paper Co., at the House of Lundington in Escanaba, Mich.

The speakers came to Escanaba in a Mead Corp. plane, accompanied by Harry Tellshaw and Torb Roberts, also of Donnellys; Robert Heidl, Mead Corp., Chillicothe, Ohio; William Tilden and Nelson Mead of Mead Sales Co., Dayton.

ADDITIONAL C/N

WASHINGTON, D. C.—Latest NPA approvals of certificates of necessity include, Paperboard Co., San Bernardino, Calif., $2,175,000 of which 60 percent was certified; and M & G Co., Green Bay, Wis., pulp and corrugating board, $534,597, of which 50 percent was certified.

ISRAEL WALLBOARD PLANT

A contract has been signed between Israel Purchasing Service, Inc., a wholly owned subsidiary of Ampal-American Palestine Trading Corp., and United States Wallboard Machinery Co., which will allow the establishment in Israel of a modern up-to-date wallboard factory manufacturing insulating and hardboard from wood waste and eucalyptus trees which have been planted in Israel.

The factory will be known as "Sefen" and will involve an investment of approximately $3 million in plant, machinery and equipment, and it is expected to be in production within 18 months.

The plant is being built as a result of the joint efforts of American and Israeli investors. The American group is composed of Ampal-American Palestine Trading Corp. together with individual American industrialists incorporated as the Israel Fiberboard Products Corp., Inc. The Israeli group is composed of five settlements in the Jordan Valley, consisting of Afikim, Beth-Zera, Dgania "A", Dgania "B" and Kinnereth.

Afikim, one of the group who are erecting this factory in Israel, has already built a modern plywood factory whose products are so good that they are being imported into the United States and England.

CONSTRUCT PULPWOOD YARD

ST. GEORGE, S.C.—The Georgetown mill of the International Paper Co. is constructing a loading and storage yard for pulpwood.

Old Wheels Are Useful to Defense

Steel plant and foundry inventories of iron and steel scrap are dangerously low at present. Administrative officials in industrial plants can help maintain steel production at current record levels and aid defense by canvassing their plants for idle, obsolete machinery and equipment; write it off inventory and assure that dormant scrap, like that shown above, moves quickly into normal scrap collection channels.

INCREASE NEWSPRINT PRICE

OTTAWA — The Mersey Paper Co., Liverpool, N. S., has increased its price by $10 a ton for newsprint, effective July 1.

Price Brothers & Co., Ltd., of Quebec, and Ontario-Minnesota Pulp and Paper Co., Ltd., of Fort Frances, Ont., have announced a similar increase.

MARVELLUM GETS D.O.

HOLYOKE, Mass. — The Marvellum Co. has received a government defense order for $25,000 of V.P.I. paper. This is a coated paper product, developed by Marvellum, which is used extensively by the military for packing gun parts for shipment to Korea.

ST. LAWRENCE RECALLS STOCK

OTTAWA—Formal notice is being given to holders of first and second preferred stocks of St. Lawrence Corp., and the first and second preferred stocks of St. Lawrence Paper Mills Co. that all the outstanding shares of these issues are called for redemption on July 16.

HOWARD-SMITH RAISES WAGE

OTTAWA — An agreement has been signed by the Howard-Smith Paper Mills Ltd., Cornwall Division, and unions calling for an 11 percent general wage boost and bringing the basic wage to $1.14 an hour for day workers and $1.17 for shift workers.

NEW WASTE PAPER FIRM

M. B. Nicastro, active in the waste paper business for several years, has established the firm of M. B. Nicastro, to handle all grades of waste paper, as a broker. Offices of the firm are located at 141 Fulton Street, Trenton, N. J. The plant is located in Morrisville, Pa.

PEOPLE

CLARKE K. WALTER has been appointed manager of the River Raisin Paper Co.'s Display Division.

WARREN M. PELLOT has been appointed to the position of assistant to the secretary-treasurer, J. W. Walter of River Raisin Paper Co.

EDWARD J. GAYNER, III, formerly a vice-president of Brunswick Pulp and Paper Co., has been elected president of the firm succeeding C. R. VAN DE CARR, JR. Mr. Van de Carr has resigned as president because of the press of his other duties including the presidency of Mead Corp. and a directorship of Scott Paper Co. In accepting Mr. Van de Carr's resignation the board of directors expresed their regrets and insisted upon his continuing as a director.

H. E. WHITAKER was elected a vice-president of Brunswick Pulp and Paper Co.

Steel Scrap Shortage

Dear Boss,

How about getting that old steam engine back into production again. By production, I mean as scrap. The steel mills are as short of scrap as we are of waste paper.

Who knows but that old engine may come back to us in the new machine we have on order.

Hank

P. S. While we are at it, let's get rid of that pile of old pipe, beater bars and jordan filling.

GEORGE F. WHITING who graduates from Amherst College this month plans to enter the Whiting Paper Co. by the end of the month. He will be the second member of the fourth generation of Whitings to be with that company. His brother, William Whiting, Jr., has been with the firm for the past year since his graduation.

FRANK C. CALDWELL, Vice President for manufacturing, was elected to the Board of Directors of Ferguson-Lander Box Co. JOSEPH F. HOYER was also elected to the Board and at a subsequent meeting of the Directors was elected Treasurer of the company. All other directors and officers were re-elected.

FORESTRY

FOREST CONSERVATION

Chief Forester Lyle F. Watts of the United States Forest Service recently addressed a group of prominent members of Congress who were the guests of Representative Frank W. Boykin of Alabama. The remarks of the Chief of the U. S. Forest Service were directed toward the importance of forest conservation to this country. He stressed the need for continuing forest activity to make our forest lands fully productive, and paid a high compliment to the forestry work being done by the southern pulp and paper industry. He said in part:

"Too many people think the bulk of our privately owned timber land is held by the large lumber and pulp and paper companies. This is not the fact. Actually, the so-called industrial forest properties contain only 15 per cent of the forest land in private ownership. Eighty-five percent of the forest land is treated badly. That also is not true in the main. Currently less than one-third of the cutting on industrial land is destructive. In the South it is much less than that. On the other hand, less than 10 percent of the cutting on lands of small owners can be classed as acceptable. Obviously the three-fourths of the commercial forest land in medium to small ownership is the heart of our forest problem.

"Frequently I have been called a pessimist because I continue to pound on the forest problem of America and our failure to meet it. I think it's my job to point out those problems rather than to complacently lull our people to sleep by pointing just to the progress we have made. And let me again pay my compliments to the progress made by the pulp and paper interests which is paticularly outstanding. In the South I would guess that only about 10 percent of the cutting on such land is destructive.

"More than three-fourths of all timber products are cut from trees of sawtimber size. We are cutting more than one and a half times as much of that size trees as we grow. Not only are we reducing our saw timber by about one percent a year, but we are rapidly removing the more valuable species of trees. Our forests are deteriorating. The drain and growth are fairly close to balance only so long as we talk about cubic feet. That includes the very small trees regardless of species or quality.

"Recently I had occasion to take a trip through Florida and Georgia. I had covered the same route eight years ago. On the first trip I saw wild forest fires everywhere and relatively few planted forests. On the last trip I saw few forest fires and many, many acres of planted forests. It was fine to see such progress. We just need to step up that progress with the same aggressiveness with which we conquered the West.

"Before I close I want to pay my respects to the pulp and paper industry in the South. It was a great day for forestry in the South when paper from southern pine was made practical. That development brought a demand for small-sized trees that made intensive forestry possible, the dream of practicing foresters. To be sure, I could point out bad effects which should not be, but the over-all effect is good. Today there is another big upsurge in plant expansion."

PULP MILLS SELL FORESTRY

As part of a southwide program sponsored by the Southern Pulpwood Conservation Assn. and financed by the pulp mills, approximately 750 farm boys will be given a week's camping experience where they will have a chance to learn a few of the fundamentals of forestry and the part that the forests in the South must play in growing wood for the future, as well as providing for current defense needs.

This program is in its seventh year of operation and during this period over 4,000 boys will have been the guests of the pulp mills at camps operated by the State Forestry Departments in nine of the southern states. The mills contribute from $10,000 to $12,000 annually to this project and consider the investment in forestry training for the future landowners well worthwhile, since most of the wood used by the southern pulp mills comes from small woodlands.

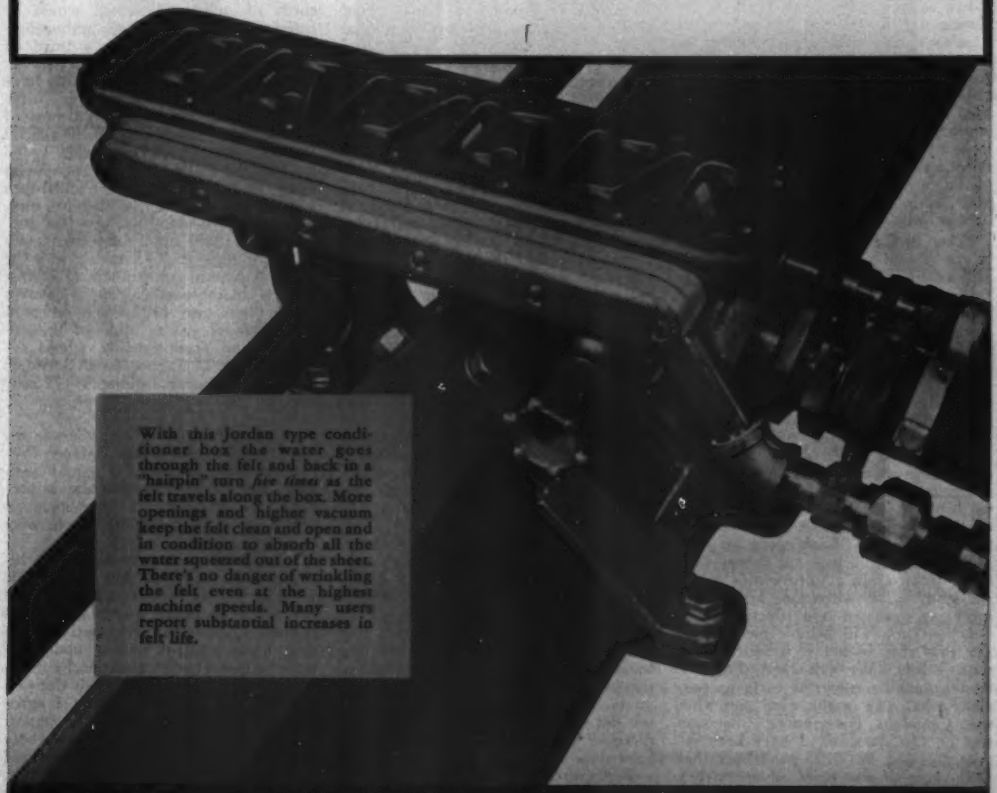
HOW CAN YOU DO WITHOUT THIS UNDER TODAY'S CONDITIONS?

The harder and faster you work your press felts, the more you need VICKERY FELT CONDITIONERS with Jordan type conditioner boxes, like the one pictured.

When felts run faster they fill up faster. Yet mid-week machine shutdowns to unclog felts can no longer be tolerated.

That is why so many Vickery Felt Conditioners with Jordan type boxes are going in right now.

How about *your* press felts? Are they equipped to meet today's production demands?



With this Jordan type conditioner box the water goes through the felt and back in a "hairpin" turn *five times* as the felt travels along the box. More openings and higher vacuum keep the felt clean and open and in condition to absorb all the water squeezed out of the sheet. There's no danger of wrinkling the felt even at the highest machine speeds. Many users report substantial increases in felt life.

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Fowler Answers Di Salle

2280 Sun Life Building,
Montreal 2, P. Q.
12th June 1951

Michael V. Di Salle, Esq.,
Director,
Office of Price Stabilization,
Washington 25, D. C.

Dear Mr. Di Salle:

Your letter of June 4th was delayed somewhat in reaching me as it was not received in Ottawa until June 8th and had to be forwarded to me here. I sent you a telegram on Friday last to tell you of this delay and promised to send an early reply to your leter.

I regret if there has been any misunderstanding between your office and this Department, and regret even more that you seem to feel that we did not fully comply with the arrangements we had made for advising you of developments in the newsprint price situation. When matters came to a head in the closing days of May, I had before me a newspaper report of your letter to Senator Johnson of Colorado which set forth your understanding of the arrangement between us. This statement used practically the same words as appear in the second paragraph of your letter of June 4th. This paragraph contains an accurate report of my telephone conversation early in May with Mr. Diskin of your office and reads in part as follows:

"You further stated that when and if you should receive such notification (of an individual Canadian mill's desire and intention to increase its newsprint price) you would examine the situation to determine whether it was an individual case or an industry problem, that if the proposed increase seemed justified the matter would be taken up with the Canadian government and that we would be advised before any increases were put into effect."

The present newsprint price increase announced by Abitibi goes into effect on July 1st, 1951. The notice to your office was given by the Department's representative in Washington on May 31st and thus you had, not twenty-four hours' notice, but a full month's notice for study of the situation "before any increases were put into effect."

I hope you will believe me when I say that this is not a technical play with words. We felt here that you would want to know, as early as possible, what was in the wind and what the Canadian government's decision was on this question. I have been repeatedly told by U.S. publishers that in the case of past price advances they objected particularly to the shortness of time between the date of the announcement and the effective date of the price increase, which gave them no opportunity to adjust their economies to the price change. This time, greater advance notice of the price rise was given and I felt that the essential step was to have the situation clear and publicly known as soon as possible after your office had been notified rather than to have a protracted period of speculation and rumour.

The steps outlined in the sentence from your letter, quoted above, were taken exactly as I told Mr. Diskin they would be taken. I had asked in April each Canadian newsprint manufacturer not to change his prices without first discussing the proposed change and the reasons therefor with the Department. At the time of our conversation I knew that there had been recent substantial increases in manufacturing costs and I told your office there was considerable grumbling about present prices. Shortly afterwards I received from the Abitibi Power & Paper Co. Ltd., which is one of the larger Canadian manufacturers, a request for discussion of a price increase which seemed to that company to be necessary. We met and I was given information as to the factors affecting the maintenance and expansion of newsprint production. Then to see if the problem was peculiar to the applicant or general throughout the industry, I inquired from a number of other manufacturers asking for their individual views and intentions. These companies produce over 50 percent of the newsprint made in Canada and are representative of the whole industry. It was quite clear that the problem was not peculiar to the applicant company but was a general problem affecting the whole Canadian industry.

The information thus obtained was submitted to the Minister of Defence Production. It was studied by his advisors and their recommendation was placed before the Canadian Cabinet. The Canadian government, which it should be pointed out is not operating any overall system of price controls, decided that it would not use its emergency powers to interfere with the commercial decision being taken by the Abitibi Power and Paper Co. Ltd. This decision was taken on Wednesday, 30th May, and was immediately transmitted to your office by this Department's representative in Washington during the morning of May 31st. I was authorized to communicate this decision to the Abitibi Company and to give similar advice to any other newsprint manufacturer who proposes an increase in the price of newsprint not out of line with the amount of the increase proposed by Abitibi; and I have done so.

Perhaps it may assist you and the members of your various committees if I list some of the facts that I reported to the Canadian government before it reached its decision.

(1) The pulp content of a ton of newsprint could be sold in the U.S. for more than the newsprint itself, without any provision for finishing or packaging costs.

(2) Newsprint depends on the same raw material—pulpwood—as other pulp and paper products. Since the termination of World War II price controls, newsprint prices in the U.S. had advanced 26.2 percent. By comparison, since the end of controls in the U.S. book paper prices have advanced 54.3 percent; kraft wrapping papers, 63.1 percent; paperboard, 91.2 percent; and tissue papers, 93.4 percent. If the price of newsprint had risen since decontrol as much as the U.S. government pulp and paper index, the newsprint price would now be $143 per ton. If it had risen as much as the weighted average increase shown by the four named major grades the price would now be $145 per ton.

(3) Newsprint has not apparently been attractive to new risk capital. Since the last war there have been ten pulp and paper mills constructed or rebuilt in Canada and not one of them is producing newsprint. Together these mills consume annually about 1,250,000 cords of pulpwood, which would be sufficient to produce over a million tons of newsprint. Had even a third of this new capacity gone into newsprint, it would have been sufficient to have met all apparent shortages in North America and to have relieved most of the serious situations of newsprint shortage throughout the world.

(4) Despite the fact that newsprint supply for the U.S. in 1951 will reach a new record of nearly six million tons, there is still demand in excess of supply. This 1951 total compares with 3,480,000 tons in 1945 which was the last full year of government rationing. This is an increase in supply of over 2½ million tons or 72 percent in a period of six years. Most of this increase came from Canada, whose exports to the U.S. rose from 2,666,000 tons in 1945 to an estimated 4,775,000 tons in 1951—an increase of over 79 percent.

(5) I expressed my own view in my report to the Minister of Defence Production in these words. "The most serious problem in newsprint today is production—maintenance of present levels and increased production wherever possible."

I have written at some length because I am anxious that you should know the facts in this case as placed before the Canadian government when it made its decision not to initiate positive price control action under its standby emergency legislation by interfering with the commercial decision made by the Abitibi Company. I agree completely with you as to the importance of the trade in newsprint to both countries; you need our newsprint and Canada needs and wants your market.

I hope that after study and reflection you will agree that the Canadian government's decision was a wise one.

Yours sincerely,
R. M. Fowler
Director
Pulp and Paper Division

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Stock lines in food, paper, and chemical plants; heat exchanger units in processing industries; cooling coils in breweries, beverage industry, dairies and dairy equipment . . . throughout all industry, wherever there's a stainless or high alloy tubing application, there you'll find TRENTWELD.

And it's to be expected! TRENTWELD is made in a *tube* mill by *tube* engineers who roll and weld stainless and high alloy tubing *exclusively*. Then too, TRENTWELD is available in a full range of sizes—⅛" to 36" in diameter. This coupled with Trent's convenient mid-continent location means prompt delivery of what you want . . . when you want it. If yours is a stainless or high alloy tubing requirement: Call on us. TRENT TUBE COMPANY, *Subsidiary of Crucible Steel Company of America.* General offices and plant: East Troy, Wisconsin; Sales offices in principal cities.

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STAINLESS STEEL TUBING

GOVERNMENT GOSPEL

Ceiling Price Adjustment for Losses

Manufacturers who are experiencing losses in the operation of separate plants or factories may appeal to the OPS for upward adjustments of their ceiling prices under the provisions of Amendment 1 to General Overriding Regulation 10, effective June 7.

Prior to issuance of the amendment, manufacturers could apply for relief under GOR 10 only if they experienced over-all losses because of ceiling price regulations.

Ask GCPR Adjustment

Wholesale paper distributors today recommended to OPS officials that a special regulation be written adapting the principles of SR 29 to the General Ceiling Price Regulation to the practices and problems of their industry.

SR 29 permits distributors to pass on increases in manufacturers prices put into effect under the Manufacturers' CPR 22, and obtain relief in instances where their ceilings did not provide a normal mark-up.

The paper distributors, members of the Fine Paper Merchants Industry Advisory Committee and the Wrapping Paper Merchants Industry Advisory Committee, said SR 29 seemed to be a workable instrument but definitions should be more sharply drawn to fit the paper trade, covering such items as net invoice costs, bracket pricing, and differentiation between commodities.

A combined task force of three members from each of the committees was appointed to work over SR 29 paragraph by paragraph with OPS officials at a meeting tomorrow.

The two advisory committees met separately. The meetings were conducted by M. C. Walsh, deputy chief, Pulp, paper and Paperboard Branch, assisted by William G. Luke, Jr., industrial consultant for fine and wrapping paper merchants.

OPS officials who attended both sessions are:

Walter J. Damtoft, Rufus I. Worrell, Carlton F. Diskin, B. W. Recknagel, consultant paper shipping sacks; Daniel H. Keck, industrial consultant groundwood and book papers; J. R. W. Street, consultant kraft papers; W. S. Dade, consultant tissue paper and tissue products; Charles Evans, William Soboroff and Harrison J. Daysh counsels; W. G. Noland, economist; and Walter R. Moulton, Office of Advisory Committees.

John Franzen, William Chisholm and Dan Smith of the NPA paper section were present.

May Cutback Newsprint Output

WASHINGTON, D. C.—NPA officials told Congress on June 13 there was a possibility that production of newsprint would have to be cut back this year because of a sulphur shortage.

John F. Wood, chief of NPA's sulphur unit told a House newsprint subcommittee that there would be an estimated shortage of 722,000 tons of sulphur this year.

He said steel, petroleum, basic chemicals and rubber would get top priority on the sulphur available. Asked whether he had considered the importance of newsprint, Mr. Wood replied his office had "not gotten down to cases yet."

H. H. Heller of NPA's pulp and paper division said the question was one of limiting pulp, and that his office had not yet determined the allocation between different types of pulp. He said his office was now working on a limitation of pulp production.

Mr. Wood said he opposed sulphur exports of more than 800,000 tons a year but was overruled by an interagency committee, which includes ECA and the Department of State.

Casein for Austria

WASHINGTON, D. C.—Casein totaling $60,000 was authorized to be procured from Latin American sources for account of Austria, by ECA this week.

Paper for French Territories

WASHINGTON, D. C. — A $100,000 paper procurement order for French overseas territories was approved by ECA this week. The paper and related products does not include pulpwood or newsprint, and will be filled from United States sources.

Accelerated Amortization

WASHINGTON, D. C.—Amounts paid for industrial waste treatment works could be amortized at an accelerated rate for income-tax purposes under S. 1472, a bill by Senator Kefauver, Dem., Tenn.

Another bill, in the House by Rep. Abernethy, H.J. Res., 263, provides for timber access roads in various government-owned forests, and has been referred to the House Agriculture Committee.

Applications for C.N.

The Defense Production Administration has announced that applications for certificates of necessity for certain types of industrial expansion filed after June 15 will not be considered by the National Production Authority, U. S. Department of Commerce, except in urgent cases, until after the present backlog has been processed.

Edwin T. Gibson, Acting Administrator of DPA, stressed that the June 15 date applies only to applications to be reviewed by NPA. Those referred to other delegate agencies are not affected by this action. Mr. Gibson pointed out, however, that the Petroleum Administration for Defense, in the Department of the Interior, several weeks ago discontinued recommending approval of certificates of necessity for basic expansion in petroleum refining facilities until after its backlog on hand as of April 30 had been processed.

Advisory Committee Activities

WASHINGTON, D. C.—Envelope manufacturers, June 11 — recommended "tailored" pricing regulation for their industry which would follow SR 2 to CPR 22; they reported CPR 22 was not suitable to their industry. Pending further action, they suggested industry continue pricing under GCPR.

Special Paperboard, June 13 — discussed definitions of product lines and key items which could be used for cost studies to determine ceilings for those lines. Agreed dollars-and-cents ceilings could be fixed for most food board items, and some grades of cardboard could be similarly priced; other grades of cardboard, however, and many industrial paperboards, they said, would have to be priced by some formula.

Paper Shipping Sack; June 12—asked that the industry be permitted to use the first two quarters of 1949 as a base period for determining ceiling prices under the manufacturers' regulation, CPR 22.

Members said use of a base period between July 1, 1949 to June 24, 1950, as under CPR 22, would result in abnormally low prices, and might result in serious curtailment of production.

The committee strongly recommended that the base period for figuring ceiling prices on paper shipping sacks under CPR 22 be extended to include the first and second quarters of 1949, or that the industry be permitted to continue to price under the General Ceiling Price Regulation until a tailored pricing regulation can be issued for the industry.

Newsprint, June 12—indicated their industry would be entitled to increases of from $3.00 to $5.00 per ton in their newsprint ceilings under the Manufacturers General Ceiling Price Regulation, CPR 22.

They reported their current prices under GCPR, are running from $105 to $110 per ton, including various freight allowances, and are several dollars under Canadian prices.

Committeemen discussed whether spelled out dollars and cents ceilings or an upward adjustment of base period prices by a specified industry-wide differential would be the more satisfactory method of control.

They indicated that the old OPA MPR 130, which placed dollars and cents ceilings on newsprint, would provide a possible means of price regulation, but a majority felt the old zoning system outlined in MPR 130 was outmoded and unsatisfactory.

The alternative proposal, which committeemen favored, would be for each

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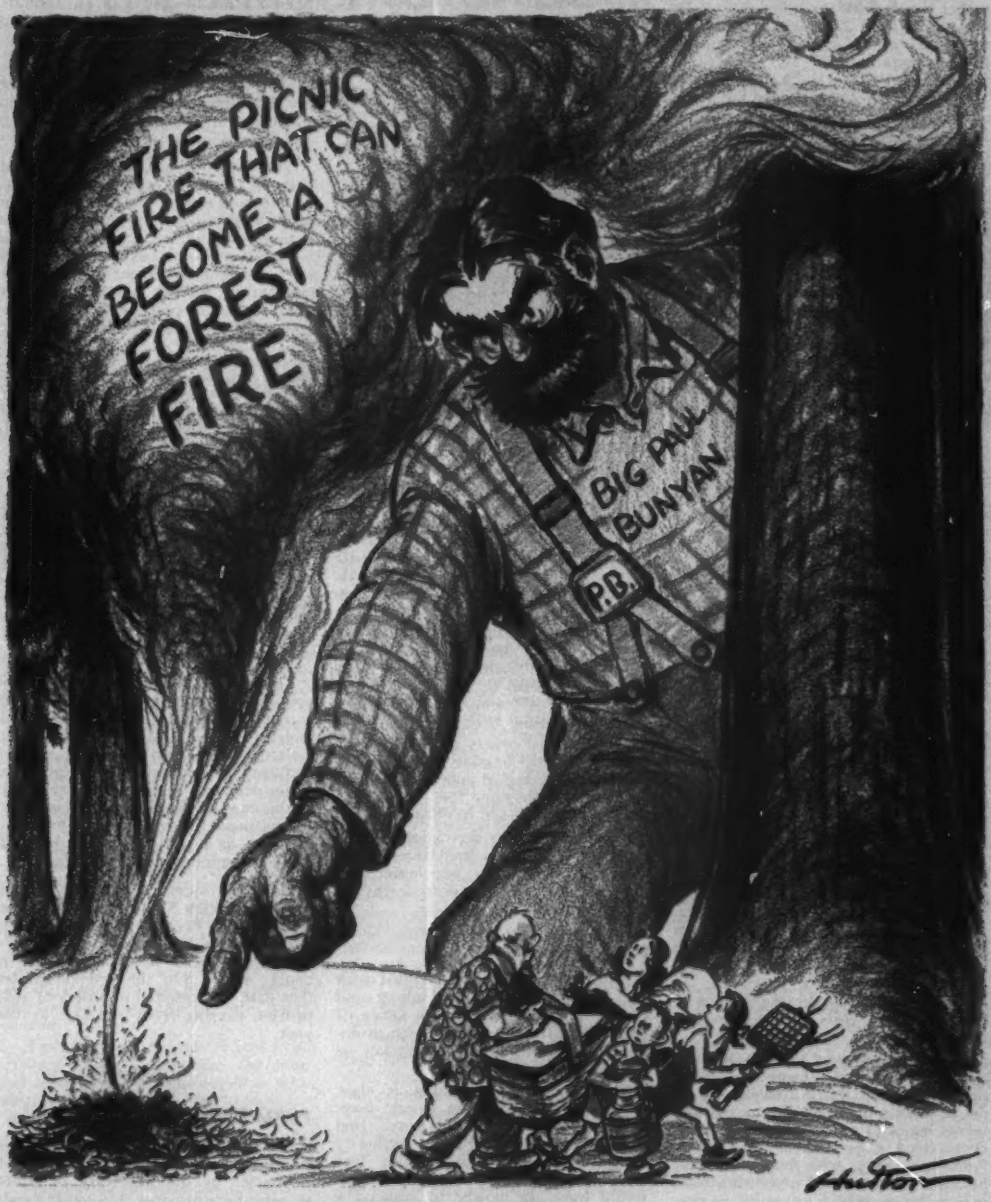
230 PARK AVENUE, NEW YORK 17, N. Y.
20 NORTH WACKER DRIVE, CHICAGO 6, ILL.

MEAD
pulp

DISTRIBUTORS OF WOOD PULP
BLEACHED AND UNBLEACHED
CHEMICAL AND MECHANICAL WOOD PULP



"PUT IT OUT!"

A reproduction of this booklet from the fabulous life of Paul Bunyan—the fifty-eighth of a series—will be sent on request. It will contain no advertising.

manufacturer to adjust his GCPR ceiling prices upward by a fixed amount around $3.00 or $4.00 which would be uniform for the whole industry.

Committeemen said they preferred to have a flat increase industry-wide rather than to calculate individual ceilings under CPR 22, which would leave individual manufacturers with divergent ceilings in a highly competitive industry.

The question whether to fix ceilings on imported newsprint from Canada was discussed. Manufacturers pointed out thta if American newsprint was controlled and Canadian newsprint uncontrolled it would create a hardship on newspaper publishers dependent wholly on Canadian newsprint.

May Allocate More Newsprint

OTTAWA—The allocation of newsprint to France by the international materials conference may be followed by other allocations during the next few months, Defense Production Minister Howe hinted in Parliament.

"The pulp and paper committee has recommended one allocation of newsprint to France and it is possible that there will be others during the next few months," Mr. Howe said.

"I think that no one will quarrel with the desirability of North America assuring that our allies have at least minimum amounts of newsprint available in order to combat the claims of Communism. It seems that in the free countries where Communism is the greatest threat, the Communist papers in one way or another get newsprint. It is important that we ensure that the free press of these countries also secure supplies."

"As I mentioned, the international materials conference has recommended an emergency allocation of 3,000 tons of newsprint to France, 2,500 tons of which is to be supplied by Canada. I have, under the powers granted to me by the Defense Production Act, instructed the Director of the Pulp and Paper Division to make an equitable levy on all Canadian newsprint producers for the purpose of providing the aforesaid 2,500 tons of newsprint. This purchase will be made by the Canadian Commercial Corp., on behalf of France, at prices not inconsistent with contract prices prevailing in North America, but having regard to any additional costs involved in this transaction."

"I do not believe that it will be necessary to divert a large tonnage of newsprint from North America in order to satisfy these emergency requirements but with our mills already overcommitteed it is obvious that North American users, who are by far the heaviest consumers of newsprint, must expect some cutback in order to provide this tonnage. Every precaution will be taken to requisition in such a way as to minimize the impact on producers and consumers in this country."

Confer on Earning Standards

Top officials of the OPS are holding conferences this week to develop methods of carrying out the industry earning standards announced in April by Economic Stabilizer Eric Johnston.

Under Mr. Johnston's directive on earning standards, ceiling prices for "an industry shall be considered 'generally fair and equitable' under the Defense Production Act if the dollar profits of the industry amount to 85 percent of the average for an industry's best three years during the period 1946-49, inclusive."

In his directive of April 21, Mr. Johnston concluded by saying he understood the "OPS will develop in greater detail the methods for applying the above standard and also standards for permissive increases justified by exceptional reasons of public policy."

Amend Regulation 3

The NPA has modified the procedure by which persons residing in Canada may certify priority orders for maintenance, repair and operating supplies obtained in this country.

Persons living in Canada may now certify such MRO purchases under NPA Regulation 3, which is amended to include the identical MRO provisions set forth in Regulation 4. The advantage of this change is that it brings together in one document all of the provisions affecting persons in Canada who make priorities purchases in the United States.

No such application will be issued by NPA unless the application is approved by the Priorities Division. Such certifications shall be marked with the symbols "DO-47" and "Certified under NPA Regulation 3."

Similar rated orders placed prior to June 15, 1951, bearing the symbols DO-47 and "Certified under Regulation 4," will have the same force and effect as if certified under Regulation 3.

Canadian MRO certifications are subject to the same limitations as to materials which may be obtained as those which apply to persons in the United States.

Business Licensing

A memorandum has been filed with the House and Senate Banking and Currency Committees by the Office of Price Stabilization setting forth in detail the reasons why the agency is seeking licensing authority.

This memorandum makes it clear that every business firm would have "an absolute right to a license," that it would not give OPS the authority to prevent persons from going into business, and that only the courts would have the power to suspend a license.

The proposal to grant the OPS licensing authority is contained in a pending amendment to legislation extending the Defense Production Act of 1950, on which hearings are currently being held.

"This amendment, which is offered as a general enforcement device for price control only, provides that a license *must* be given as an absolute right to anyone engaged or desiring to engage in business," the memorandum points out.

"No license can be required under the amendment of (a) farmers and fishermen, or (b) newspapers, radio, and television stations."

The OPS memorandum points out that the agency is not seeking an unprecedented power, but that more than 20 Federal statutes having no relationship to wartime emergencies contain licensing provisions as a necessary aid in securing compliance, and that the amendment follows almost word for word provisions contained in the Emergency Price Control Act of 1942.

Only a court, the memorandum points out, would have the power to suspend a license, and then only after "a legal proceeding which is designed to give the licensee every safeguard. . . ."

Stressing the need for flexibility in enforcement provisions, the memorandum states: "The proposed licensing system provides a method whereby there can be taken into account in connection with each violation the degree of willfullness involved, the seriousness of the violation, the nature of the violator's business, and the importance of his business to the community as a whole."

The memorandum concludes by pointing out that the licensing system is not designed to punish the initial violator, but to "restrain the persistent violator." The mere existence of this authority, it contends, would prove a major deterrent to violations, especially in the case of "a small group of willful businessmen who regard financial penalties as merely 'taxes' to be paid for a continuing unlawful profit.

From the inception of price control in 1942 through March 31, 1945, there were 32,118 license warnings issued, but as of May 1, 1945, only 325 license-suspension suits had been filed in court; out of 116 suits completed on that date, 101 resulted in orders of suspension varying from two days to one year.

FORM SOUTHERN PAPER CO.

GREENSBORO, N. C.—Southern Paper & Cordage Co., Inc. has been granted a charter by the Secretary of State to manufacture paper and paper products. Authorized capital stock is 1,000 shares, no par value. Charles Wagner, Wiley Wagner and D. E. Hudgins, all of Greensboro, were listed as the incorporators.

The Influence of Electrolytes on Pulp & Paper Properties*

Part I—Cation Effects

W. E. Cohen[1], Gwenneth Farrant[2] and A. J. Watson[3]

Summary

The results of a systematic study of the influence of cations on pulp and paper properties are discussed. Preliminary investigations showed that washing pulp to remove salts carried by it from the pulp mill significantly influenced the properties of paper made from the unbeaten pulp and also the pulp's response to beating in the Lampen mill. The effect of a dilute acid wash is greater than that of a water wash. Water-washed pulps and acid-washed pulps are equally sensitive to cation effects.

The results presented demonstrate that the physical properties of paper are influenced by the presence of electrolytes in the process water; that the effect increases, within limits, with the concentration of the cation and varies, with some exceptions, with the valency of the cation. Some properties are more sensitive than are others. Freeness and air resistance are the most sensitive, these being affected by all cations. Bursting and tensile strengths are sensitive to most cations, while bulk and internal tearing resistance are the least sensitive, these being affected only when the process water contains hydrogen ion or polyvalent cations. Drainage time is also sensitive, the effect increasing with the concentration and with the valency of the cation. This sensitivity to cations is not specific to eucalypt pulps. Long-fibered kraft and sulphite pulps are affected in a similar manner.

With those cations which lead to decreased strength properties, the greatest effect is due to retardation of beating; with those which lead to increased strength properties, beating is accelerated. Some practical consequences of this are indicated.

An attempt is made to reconcile cation effects with existing knowledge of the electro-kinetic potentials of cellulose.

Some practical aspects arising from electrolyte effects, and related to pulp evaluation and paper manufacture, are outlined.

Introduction

Some properties of pulp and paper are influenced by the presence of certain electrolytes in the process water *(1) (2) (3)*. Some of the physical properties of an aqueous pulp suspension are sensitive to small amounts of electrolytes. Thus Adams, Simmonds and Baird *(4)* reported that the freeness of pulps was increased by the presence of acids or electrolytes in the water and Bell *(5)* made similar observations on the drainage rate of pulps after the addition of various electrolytes to the pulp suspension. In both papers the fact is stressed that the influence of the various electrolytes increases with the valency of the cation. Investigations carried out in the Division of Forest Products on eucalypt kraft pulps gave similar results *(3)*. Schwalbe *(6)* demonstrated that the presence of electroylte influenced the rate of settling of pulps from aqueous suspensions. He used considerably higher concentrations than those normally encountered in water supplies, but his data indicated that lower concentrations would have some effect on this property.

Cellulose fibres in aqueous suspension carry a negative charge and, in some respects, e.g., their behaviour in the presence of electrolytes, they exhibit the properties of a negatively charged colloid.

Briggs *(7)* has shown that the surface conductivity of cellulose fibers is influenced by the presence of electrolytes in the surrounding water. He also demonstrated that the zeta-potential was influenced in a similar manner, very dilute concentrations producing appreciable changes in its magnitude. Mason *(8)* demonstrated that the zeta-potential was increased at very low electrolyte concentrations, due to the preferential adsorption of negative ions. He considered that the existence of a surface charge could be related to the effects observed on freeness and on drainage time.

It is evident from these investigations that cellulose fibers are sensitive to electrolyte concentrations similar to those encountered in normal water supplies. Although most of the evidence so far reported is not in a form which can be related directly to the strength properties of pulp and paper, there are some indications that electrolytes do influence pulps in such a manner as to affect the quality of paper prepared from them. This paper presents data, which have been accumulated since 1942 within the Division of Forest Products, on the influence of various electrolytes on the strength properties of pulp and paper.

Preliminary Experiments

The diverse nature of the problem and the long period over which the investigations have been extended made it inevitable that there would be various modifications and improvements in technique as the work proceeded. Before detailed systematic investigations could be undertaken, a considerable amount of exploratory work was necessary. Initially, much attention was paid to the applied nature of the problem, the work being directed towards the development of procedures which would avoid the differences in pulp evaluation data which had been observed in various mills due to the use of dissimilar water supplies. Recently, attention has been directed to more fundamental aspects of the problem.

Selection of a Typical Pulp

The initial investigations in this study were made with eucalypt kraft pulps. It was realized, however, that sensitivity to the presence of electrolytes would not necessarily be the same for different pulps and that the

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possibility of variation should be examined. Long-fibered and short-fibered pulps prepared by different processes were evaluated, both in distilled water and in distilled water containing varying amounts of electroyltes.

The results *(Table I)* indicated that all types of pulp were influenced in a similar manner by the presence of the various electrolytes. Eucalypt kraft pulp was therefore selected for use in most of the experimental work.

Preparation of the Pulp Sample

Pulp, as received from the pulp mill, always contains small amounts of soluble materials which can be removed only by very thorough washing. For investigation of the influence exerted by any particular electrolyte, it is essential that all mineral constituents likely to interfere should be removed from the pulp. Continued washing with distilled water failed to reduce the ash content of eucalypt kraft below 0.6-0.7 percent. Treatment with 0.1N hydrochloric acid for about 30 minutes, followed by distilled water until the pulp was free from chlorides, reduced the ash content to 0.11-0.14 percent. The ash content of eucalypt soda pulp was reduced from 0.5-0.6 percent to 0.1 percent after acid treatment. The pH of the pulp suspensions of the water-washed pulps varied from 5.5 to 6.5, and that of the acid-washed pulps from 4.3 to 4.6.

As these washing treatments might have changed the general properties of the pulp, comparative evaluations were made on pulp in the condition in which it was received, after washing thoroughly with distilled water, and after washing with 0.1N hydrochloric acid and then with water until acid-free. These pulps are referred to in the text as "as-received," "water-washed" and "acid-washed" respectively. All three were evaluated in distilled water and in town water, the results obtained being shown graphically in *Figure 1*.

The results show that the washing treatments modified the pulp's properties, the effect being equally apparent for evaluations made in either town water or distilled water. The differences are more apparent over the longer beating periods. Although the as-received pulp and the water-washed pulp differ significantly in most properties, the differences are not as great as are those between the acid-washed and as-received pulps. Acid-washing of the pulps produced an appreciable reduction in strength. As this particular treatment represents a radical departure from the usual procedure, it is evident that acid-washing is undesirable unless it is imperative that the ash content of the pulp be reduced to a minimum. Very thorough water washing, however, represents an ideal condition which for economic reasons cannot easily be attained in practice. Investigations have shown that water-washed pulps are as sensitive to the presence of electrolytes as are acid-washed pulps *(9)*. The inorganic materials, soluble in acid, but apparently insoluble in water, exert no direct influence on the evaluation. These considerations have led to the adoption of water-washed pulp for all subsequent investigations of the influence of electrolytes on pulp and paper properties.

TABLE I

INFLUENCE OF MONO-, DI- AND TRI-VALENT CATIONS ON VARIOUS PULPS

Electrolyte	Concn., p.p.m.	Freeness C.s.f., ml.	Bulk	Burst Factor	Tear Factor	Breaking Length, km.
Spruce sulphite (K. crown B.) (as-received) 4,500 Lampen rev.						
Distilled water	...	493	1.37	69.9	98	8.95
Sodium chloride	200	481	1.34	74.6	96	9.42
Magnesium chloride	50	522	1.36	70.7	98	8.86
Cerous chloride	50	557	1.36	65.1	99	8.32
Diff. significant at 5% level		23	0.017	2.3	4.2	0.36
Diff. significant at 1% level		33	0.024	3.3	6.1	0.46
Pine kraft (Ljusnan) (as received), 12,730 Lampen rev.						
Distilled water	...	521	1.44	89.6	125	10.20
Sodium chloride	200	545	1.44	92.1	126	10.20
Magnesium chloride	50	506	1.42	91.2	116	10.40
Cerous chloride	50	582	1.47	84.6	123	9.50
Diff. significant at 5% level		28	0.010	2.6	5.8	0.23
Diff. significant at 1% level		40	0.014	4.1	8.4	0.33
Hemlock kraft (St. Regis) (as-received), 12730 Lampen rev.						
Distilled water	...	378	1.41	78.3	122	9.47
Sodium chloride	200	418	1.44	77.2	131	9.06
Magnesium chloride	50	414	1.44	77.0	129	9.01
Cerous chloride	50	521	1.48	67.8	140	8.35
Diff. significant at 5% level		24	0.016	3.2	12	0.39
Diff. significant at 1% level		34	0.023	4.5	18	0.55
Eucalypt kraft (acid-washed), 4500 Lampen rev.						
Distilled water	...	400	1.54	46.6	102	7.4
Sodium chloride	200	490	1.53	49.0	102	7.7
Magnesium chloride	50	495	1.54	42.0	97	6.8
Aluminum chloride	50	522	1.57	36.1	92	6.3
Diff. significant at 5% level		29	0.013	3.4	3.1	0.33
Diff. significant at 1% level		42	0.019	4.8	4.5	0.47
Eucalypt kraft (water-washed), 4500 Lampen rev.						
Distilled water	...	337	1.56	46.4	110	8.1
Sodium chloride	200	401	1.54	55.1	109	9.2
Cerous chloride	50	507	1.56	43.0	99	7.7
Diff. significant at 5% level		13	0.020	1.7	4.8	0.47
Diff. significant at 1% level		18	0.028	2.4	6.6	0.65
Eucalypt soda pulp (acid-washed), 4500 Lampen rev.						
Distilled water	...	303	1.47	34.9	65.8	6.3
Sodium chloride	200	380	1.47	35.9	69.2	6.3
Magnesium chloride	50	392	1.47	35.0	67.0	6.3
Cerous chloride	50	418	1.49	32.7	65.1	6.0
Diff. significant at 5% level		9	0.16	1.6	3.2	0.29
Diff. significant at 1% level		13	0.23	2.2	4.5	0.40
Eucalypt soda pulp (water-washed), 4500 Lampen rev.						
Distilled water	...	402	1.50	31.9	60.8	6.4
Cerous chloride	50	471	1.52	30.1	59.5	5.9
Sulphuric acid	40	463	1.52	29.0	57.5	5.8
Cerous chloride and sulphuric acid	...	480	1.52	29.3	57.5	5.7
Diff. significant at 5% level		14	0.015	0.9	4.6	0.27
Diff. significant at 1% level		20	0.021	1.3	6.4	0.38

Note: Each value is the mean of four replications.

Influence of Electrolytes in Sheet Machine Feedwater

Earlier work on freeness *(3)* showed that the influence of electrolytes was greater when they were present in the water used in disintegrating and beating pulp than when they were added to the beaten pulp. It was still necessary to demonstrate whether their presence in sheet machine feedwater would influence sheet properties. Investigation has shown that representative electrolytes of mono- and di-valent cations, viz., sodium chloride and magnesium chloride, at concentrations in the sheet machine feedwater of up to 320 p.p.m., did not significantly influence sheet properties. Cerous chloride tended to decrease bursting and tensile strengths (see *Table II*) but the effect was significant only when the concentration was increased to 160 p.p.m. Such a concentration of an electrolyte of a trivalent cation would not normally be encountered in the town water supply even if this water were hard. Therefore town water may safely be used in the sheet machine without influencing evaluation results.

As a result of this study it was decided to use distilled water containing the electrolyte under investigation in all stages prior to the sheet making

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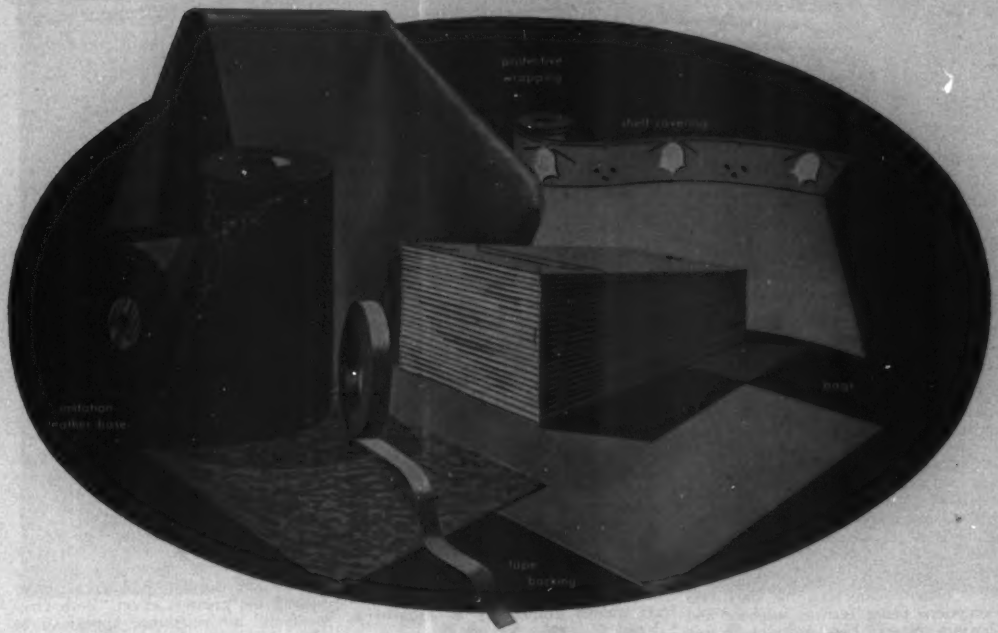

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TABLE II

INFLUENCE OF ELECTROLYTES IN THE SHEET MACHINE FEEDWATER ON SHEET PROPERTIES

(Washed eucalypt kraft MOS 44/92 beaten for 9000 rev. in Lampen mill)

Concn. of $CeCl_3$ p.p.m.	Bulk	Burst Factor	Tear Factor	Breaking Length km.
0	1.41	47.9	95	7.56
5	1.42	47.1	91	7.39
10	1.41	47.4	93	7.19
20	1.41	46.7	96	7.46
40	1.42	44.7	91	7.43
80	1.43	44.3	93	7.25
160	1.42	41.5	94	6.74

Note: Values are given only for cerous chloride as neither of the other two electrolytes employed (magnesium chloride and sodium chloride) produced any significant effect on sheet properties at concentrations up to 320 p.p.m.

and to employ town water for all subsequent work.

Systematic Study of the Effects Electrolytes on Sheet Properties

In order to study the influence of various cations in the process water on sheet properties, representative electrolytes were selected from the different valency groups, and for each cation was chosen a range of molar concentrations up to and beyond the point where preliminary experiments indicated that the effect on sheet properties would reach a maximum.

The electrolytes used in this study were usually chlorides, the only two exceptions being ferrous sulphate and thorium nitrate. Ferrous sulphate was used, partly to secure a stable ferrous salt, and partly because Cottrall and Gartshore *(2)* had stated that the occurrence of this electrolyte in tidal bore water had caused an appreciable reduction in strength properties of pulp evaluated in that water. Thorium nitrate was employed because it was the only salt of a tetravalent cation available at that time. The results obtained are set out in *Tables III-VI* and are shown graphically in *Figures 2, 3 and 4.*

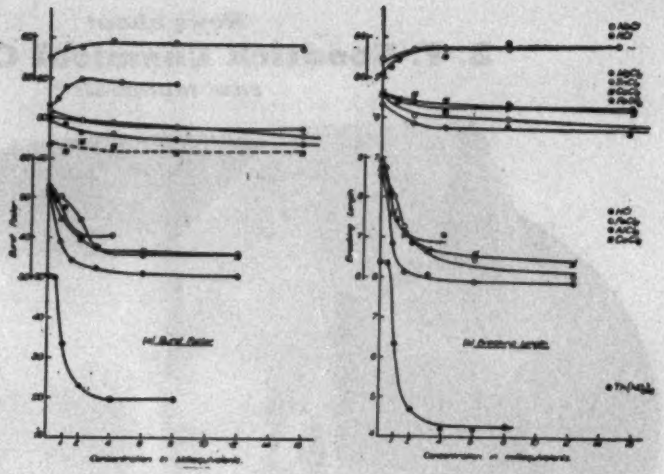


Figure 2—Influence of Cations and Their Concentration on Burst and Tensile Strength

It is immediately evident that all properties are affected both by the valency of the cation and by the electrolyte concentration, each valency group having characteristic curves relating the various properties to concentration.

The freeness curves are of the same general type as found in previous studies, the cations of highest valency having the greatest effect. Both freeness and air resistance appear to be more highly sensitive to the presence of electrolytes in the process water than are burst, tensile, tear and bulk.

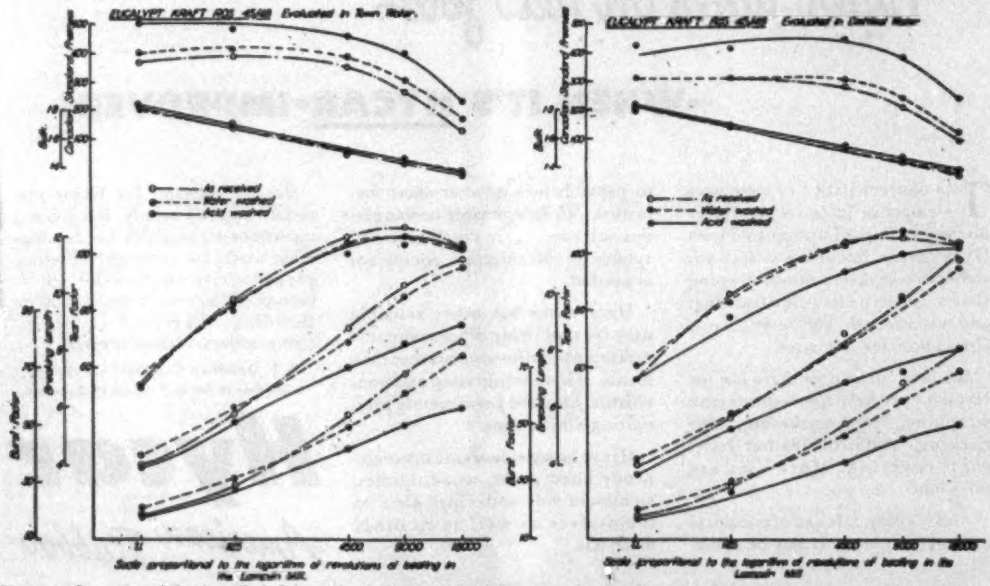
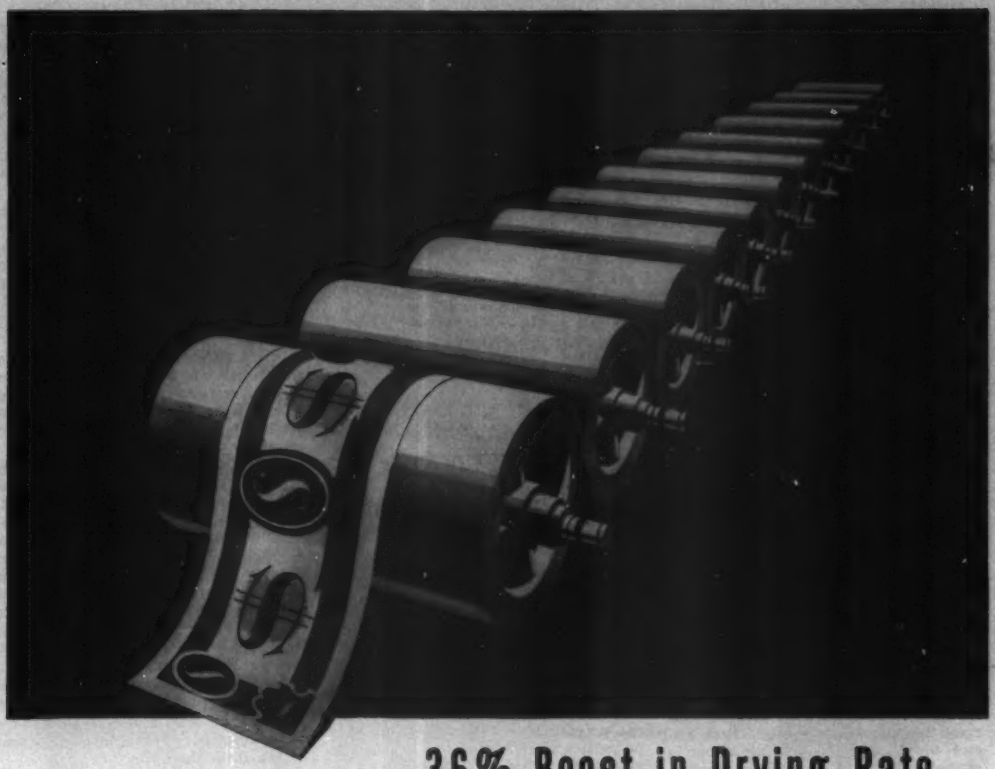


Figure 1—Properties of Eucalypt Kraft Pulp in the As-Received Condition, and after Washing with Distilled Water and Dilute Acid, When Evaluated in Town Water or Distilled Water



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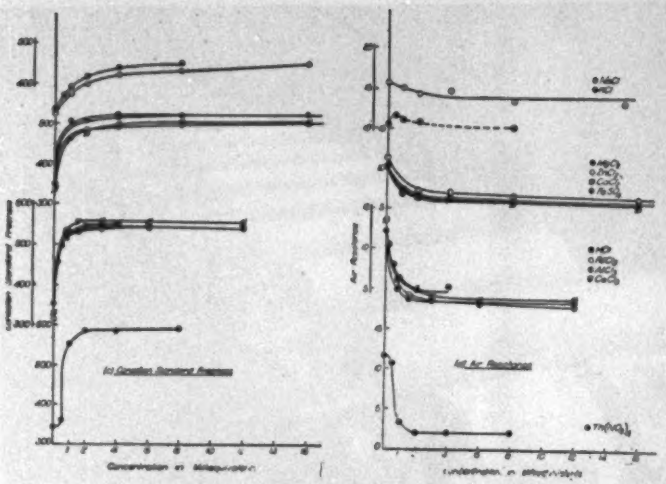

Figure 3—Influence of Cations and Their Concentration on Freeness and Air Resistance

This is shown by their reaction to the lowest concentrations of monovalent cations used in the experiment, whereas burst and tensile strengths register significant changes only at higher concentrations.

As a general rule, the presence of monovalent cations will produce a small but significant increase in some strength values, while the divalent ions cause no significant change. Both tri- and tetra-valent ions bring about a sharp decrease in strength properties, the tetravalent ions having the greater effect.

Ferrous sulphate was typical of the divalent cation group. Tests made during the course of the investigation did not show any observable oxidation of the ferrous ion. Hence it would appear that the effect of ferrous ions on sheet properties, noted by Cottrall and Gartshore *(2)*, was due to other minerals present in conjunction with the ferrous salts and not to the ferrous salts alone. It will be noted that hydrochloric acid produced an effect intermediate between those of the di- and tri-valent groups. A study of the influence of pH on strength properties has shown that within a pH range of 3.1 to 6.4, the freeness and the bulk values of the pulp were increased, and burst and tensile strengths decreased as the system was made more acid *(10)*. The effect produced by the hydrochloric acid in this study can be regarded as a hydrogen ion effect.

Although drainage time is appreciably modified by the presence of cations, the results are not strictly comparable with those of the other strength properties, as the tests were carried out in the sheet machine in which 500 ml. of stock at any of the concentrations used was diluted to seven litres with town water. However, the changes registered are indicative of the sensitivity of the test.

A similar study of the influence of anions is in progress. Preliminary experiments using chloride and sulphate ions indicate that anions do not affect the pulp properties to the same extent.

The Influence of Electrolytes on the Beating Effect

An effort has been made to ascertain the magnitude of the effect on pulp properties of electrolytes present in the process water at various stages of an evaluation. Pulp samples were subjected to two treatments over a series of beating periods. In the first, the pulp sample was beaten in distilled water and then divided into two portions. The evaluation of one portion was made in distilled water; the other in water to which an electrolyte had been added. The second treatment consisted of beating a pulp sample in the presence of the electrolyte under study and again subdividing the sample into two parts. One was evaluated in water containing the electrolyte and the other was washed free of the electrolyte and then evaluated in distilled water.

Sodium and aluminium ions were chosen for this study and they were used at concentrations found from the previous study to have maximum effects on the properties of the pulp. The results are shown in *Tables VII* and *VIII* (see pp. 100-101) and illustrated by *Figure 5*.

When sodium ion was added to the pulp which had been beaten in distilled water the freeness values at all beating periods were significantly increased but the other properties remained unaltered.

When the pulp was beaten in the presence of sodium ion, the bursting and tensile strengths of handsheets made from it were significantly greater than those of handsheets made from pulp which had been beaten in distilled water. The freeness values were the same as those observed when sodium ion was added after beating. When the electrolyte was washed from the beaten pulp by means of distilled water, the strength values were partially reduced to the level of those of the pulp which was beaten in distilled water while the freeness values were fully restored to the level of those observed on the latter.

When aluminium ion was added to the pulp which had been beaten in distilled water, freeness and bulk were significantly increased while air resistance, bursting strength and tensile strength were significantly decreased.

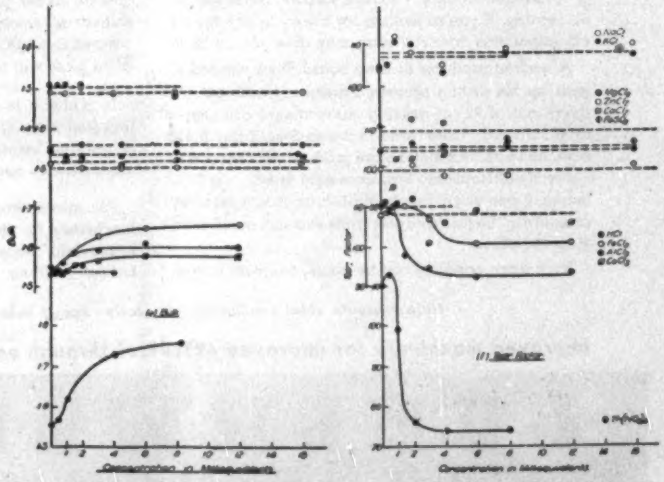

Figure 4—Influence of Cations and Their Concentration on Bulk and Internal Tearing Resistance

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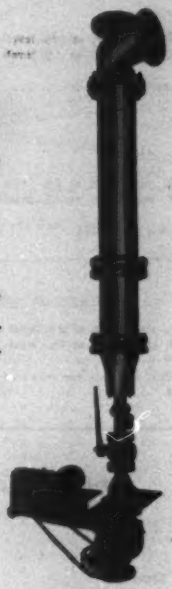

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TABLE III

THE INFLUENCE OF MONOVALENT CATIONS ON SHEET PROPERTIES

(Water-washed eucalypt kraft pulp beaten for 4500 rev. the Lampen mill)

Electrolyte	Concn. molar	Bulk	Burst Factor	Tear Factor	Breaking Length km.	Freeness C.s.f. ml.	Drainage Time sec.	Air Resistance sec.
Sodium chloride	nil	1.49	55.1	104	8.98	321	6.4	15.8
	0.001	1.49	57.2	112	8.98	375	6.3	15.1
	0.003	1.50	57.7	108	9.20	400	6.2	14.4
	0.004	1.49	59.2	105	9.24	423	6.2	14.8
	0.008	1.48	59.3	109	9.25	434	6.2	13.6
	0.016	1.49	58.0	110	9.32	455	6.0	12.3
Diff. significant at 5% level	...	...	**0.97**	**4.2**	**0.30**	**9.8**	**0.13**	**1.22**
Diff. significant at 1% level	...	...	**1.35**	**5.8**	**0.41**	**13.6**	**0.19**	**1.69**
Potassium chloride	nil	1.51	43.2	104	8.88	333	5.6	10.3
	0.0005	1.51	44.7	105	8.76	370	5.6	11.6
	0.001	1.51	46.0	110	9.19	391	5.6	11.2
	0.002	1.51	49.7	110	9.19	416	5.6	10.8
	0.004	1.49	49.4	103	9.05	440	5.4	10.4
	0.008	1.49	49.0	108	9.37	453	5.4	10.2
Diff. significant at 5% level	...	...	**1.8**	**4.3**	**0.46**	**14**	**0.09**	...
Diff. significant at 1% level	...	...	**2.4**	**5.9**	**0.65**	**19**	**0.13**	...
Hydrochloric acid	nil	1.55	52.9	110	8.93	332	6.1	11.9
	0.00025	1.54	51.8	111	8.74	453	5.8	10.5
	0.0005	1.54	49.3	109	8.04	497	5.6	8.1
	0.001	1.54	47.4	111	7.45	528	5.5	6.3
	0.002	1.56	40.2	113	6.86	547	5.3	4.9
	0.004	1.54	40.3	106	7.06	548	5.2	5.4
Diff. significant at 5% level	...	**0.010**	**2.2**	...	**0.31**	**9**	**0.22**	**0.70**
Diff. significant at 1% level	...	**0.015**	**3.1**	...	**0.43**	**12**	**0.31**	**0.97**

Each value is the mean of either four or six replications depending on the experimental design used.

TABLE IV

THE INFLUENCE OF DIVALENT CATIONS ON SHEET PROPERTIES

(Water-washed eucalypt kraft pulp beaten for 4500 rev. the Lampen mill)

Electrolyte	Concn. molar	Bulk	Burst Factor	Tear Factor	Breaking Length km.	Freeness C.s.f. ml.	Drainage Time sec.	Air Resistance sec.
Calcium chloride	nil	1.51	43.2	104	8.58	333	5.6	10.5
	0.0005	1.52	41.9	102	8.44	462	5.2	7.3
	0.001	1.52	44.1	102	8.58	476	5.1	6.7
	0.002	1.51	43.2	103	8.44	496	5.2	6.4
	0.004	1.52	41.9	106	8.26	508	5.2	6.1
	0.008	1.53	42.0	106	8.16	510	5.1	5.7
Diff. significant at 5% level	...	...	...	...	...	**9**	**0.08**	**0.81**
Diff. significant at 1% level	...	...	...	...	...	**13**	**0.11**	**1.12**
Magnesium chloride	nil	1.54	50.7	104	8.60	345	5.6	10.3
	0.005	1.53	48.2	106	8.40	504	..	7.0
	0.001	1.53	49.6	105	8.42	505	5.2	6.7
	0.002	1.53	49.1	105	8.18	522	5.3	6.1
	0.004	1.54	48.0	104	8.35	523	5.1	5.6
	0.008	1.52	48.0	104	8.27	525	5.3	6.0
Diff. significant at 5% level	...	...	**1.6**	...	...	**17**	**0.20**	**0.88**
Diff. significant at 1% level	...	...	**2.3**	...	...	**23**	**0.28**	**1.22**
Zinc chloride	nil	1.51	50.2	99	8.58	350	5.9	11.4
	0.001	1.50	49.6	100	8.06	482	5.3	7.4
	0.002	1.50	49.1	98	8.11	490	5.4	7.2
	0.004	1.50	48.2	98	7.97	501	5.3	6.8
	0.008	1.51	46.3	103	7.74	508	5.2	6.2
	0.016	1.51	44.6	96	7.52	519	5.3	5.8
Diff. significant at 5% level	...	...	**1.7**	...	**0.28**	**23**	**0.20**	**1.48**
Diff. significant at 1% level	...	...	**2.4**	...	**0.39**	**32**	**0.28**	**2.04**
Ferrous sulphate	nil	1.55	49.2	110	8.31	351	6.1	10.5
	0.001	1.56	46.6	112	7.88	504	5.6	6.9
	0.002	1.56	46.3	111	7.77	514	5.4	6.5
	0.004	1.56	45.0	107	7.81	522	5.5	6.2
	0.008	1.56	44.2	106	7.63	528	5.4	5.8
	0.016	1.56	43.5	111	7.56	535	5.4	5.4
Diff. significant at 5% level	...	...	**1.8**	...	**0.23**	**14.3**	..	**1.1**
Diff. significant at 1% level	...	...	**2.4**	...	**0.32**	**19.4**	..	**1.5**

Each value is the mean of either four or six replications depending on the experimental design used.

These effects were greater still when the aluminium ion was present during beating. When the electrolyte was washed from the pulp by means of distilled water, the strength properties were only partially restored.

From these results it is concluded that the beating effect is enhanced by the presence of monovalent cations and retarded by the presence of trivalent cations. Actually when mono- and trivalent cations are both present in the process water, their effects are opposed to one another and it is possible to counteract the retarding influence of the trivalent cations by means of monovalent cations, as is demonstrated by the data set out in *Table IX*. Thus 200 p.p.m. of sodium chloride fully counteracts the influence of 50 p.p.m. of cerous chloride on the bursting and tensile strengths of a eucalypt pulp.

Theoretical Aspects

When searching for an explanation of the effects which have been discussed above it is necessary to consider which properties of the fiber might be influenced by such small concentrations of electrolytes and to attempt to relate these to freeness and strength properties.

The Influence of Carboxyl Groups

There are several objections to the hypothesis that carboxyl groups are responsible for cation effects. It has been shown that water-washed pulps (in which the carboxyl groups are combined with metallic ions) and acid-washed pulps (which contain free carboxyl groups), are both equally sensitive to the presence of electrolytes *(9)*. Further, similar pulp samples with different carboxyl contents have been found to be equally sensitive to electrolyte effects *(11)*. It is concluded therefore that the carboxyl groups could not be considered as making any major contribution to these effects.

Electrokinetic Effects

Several workers *(7) (12) (13)* have demonstrated that the surface conductivity and the electrokinetic or zeta-potential of cellulose or wood pulp fibers may be influenced by electrolytes in very small concentrations comparable to and even less than those employed in the present investigations. It is difficult to relate surface conductivity to freeness or to general strength properties but work by Briggs *(7)* on the zeta-potential of cellulose fibers and the manner in which it is modified by traces of electrolytes, indicates a possible connection between this property and the changes in strength properties brought about by the presence of electrolytes in the process water. The zeta-potential or electrokinetic potential is observed when water passes through a fine capillary or a porous diaphragm. Conversely, if a potential difference is established between the two sides of such a diaphragm a flow of water takes place until the head of water balances the applied e.m.f.

Briggs demonstrated that mono-, di-, tri- and tetra-valent chlorides influenced the zeta-potential, the amount increasing with the valency of the cation and with the concentration. His results are similar to the changes produced by electrolytes in the strength properties of pulp *(Figures 2, 3 and 4)*.

Can the effect of electrolytes on the zeta-potential of pulp be correlated with factors influencing freeness, beating, and strength properties? It is a well-known fact that most small particles when suspended in an aqueous medium carry an electrical charge. It has been shown by electrophoresis experiments that cellulose fibers suspended in water are negatively charged *(14)*. It is evident therefore that such charged fibers will attract positively charged particles. These particles will be firmly held near the surface of the fiber but the attraction will decrease as the distance from the surface of the fiber increases. The modern view *(15)* assumes that there is a layer of ions directly surrounding the cellulose fiber. Outside is a diffuse layer where the ions are subject to thermal agitation. In this layer, positively charged ions predominate but some negatively charged ions are also present. Both types of ions are being lost to and gained from the surrounding liquid. The zeta-potential is measured across the diffuse layer, i.e., it is the potential difference between the surface of the fixed layer and the point where the diffuse layer merges with the water. This is shown diagrammatically in *Figure 6*.

The zeta-potential is very sensitive to the presence of electrolytes, ions of charge opposite to that on the fiber having the greater effect. Thus with cellulose it would be expected that the cations would have the greater influence. The influence of these ions is limited almost entirely to the diffuse layer, the fixed layer being practically unchanged by the presence of electrolytes *(15)*. The effect of electrolytes on the zeta-potential increases, with the valency of the more reactive ion. The behavior noted by Briggs for cellulose is similar to that given by many other substances which carry a negative charge. It is considered that the ions can alter the thickness of the double layer and that the thickness and the zeta-potential both decrease as the valency increases. With some tri- and with tetra-valent cations there is a reversal in the zeta-potential. This has been attributed either to the diminution in the thickness of the double layer which occurs to such an extent that it collapses and reforms with the charges reversed, or to the neutralization of the charges on the fiber. Another possibility is that the tetravalent cations are so strongly adsorbed at the interface between the fixed and the diffuse layers that the anions all project away from the surface and that a series of molecular layers is built up. There is some confirmation of this hypothesis in the very

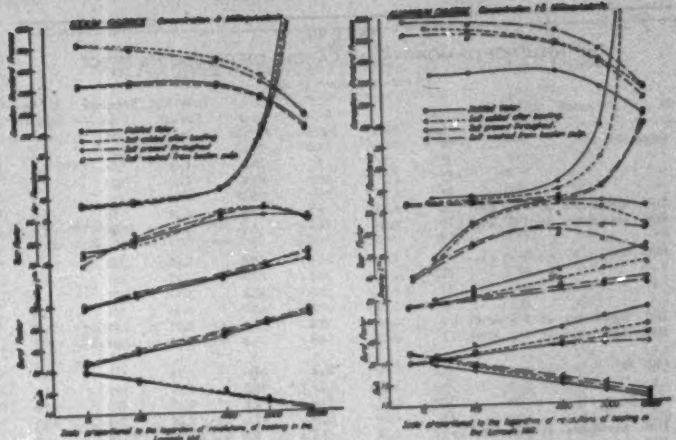

Figure 5—Influence of Mono- and Tri-Valent Cations on the Beating Effect

TABLE V

THE INFLUENCE OF TRIVALENT CATIONS ON SHEET PROPERTIES

(Water-washed eucalypt kraft pulp beaten for 4500 rev. the Lampen mill)

Electrolyte	Concn. molar	Bulk	Burst Factor	Tear Factor	Breaking Length km.	Freeness C.s.f. ml.	Drainage Time sec.	Air Resistance sec.
Cerous chloride	nil	1.53	52.6	108	8.77	330	6.2	13.6
	0.00025	1.53	44.6	115	7.60	532	5.5	6.6
	0.0005	1.56	39.6	110	7.05	552	5.3	5.1
	0.001	1.56	37.3	101	6.68	553	5.3	4.2
	0.002	1.58	36.9	109	6.59	557	5.3	3.9
	0.004	1.58	35.7	106	6.39	556	5.3	3.9
Diff. significant at 5% level	...	0.011	1.3	...	0.28	12	0.13	0.53
Diff. significant at 1% level	...	0.015	1.8	...	0.38	16	0.18	0.73
Aluminium chloride	nil	1.53	50.9	110	8.52	356	6.2	12.2
	0.00025	1.56	38.9	110	6.86	517	5.5	5.0
	0.0005	1.59	34.4	98	6.15	531	5.3	3.9
	0.001	1.59	32.7	95	6.09	541	5.3	3.7
	0.002	1.61	31.1	92	5.89	540	5.2	3.5
	0.004	1.60	30.9	94	5.90	540	5.2	3.4
Diff. significant at 5% level	...	0.014	2.31	9.4	0.39	20	0.18	1.08
Diff. significant at 1% level	...	0.018	3.12	12.7	0.53	27	0.25	1.46
Ferric chloride	nil	1.54	51.8	108	8.95	349	6.6	12.2
	0.00025	1.56	50.3	109	8.00	515	5.8	6.2
	0.0005	1.59	44.7	110	7.26	530	5.6	4.4
	0.001	1.63	37.9	107	6.42	536	5.5	3.6
	0.002	1.65	33.6	101	6.09	543	5.4	3.2
	0.004	1.66	36.3	101	6.39	546	5.4	3.0
Diff. significant at 5% level	...	0.026	5.0	4.8	0.45	27	0.24	0.95
Diff. significant at 1% level	...	0.036	7.0	6.7	0.68	38	0.34	1.32

Each value is the mean of either four or six replications depending on the experimental design used.

TABLE VI

THE INFLUENCE OF TETRAVALENT CATIONS ON SHEET PROPERTIES

(Water-washed eucalypt kraft pulp beaten for 4500 rev. the Lampen mill)

Electrolyte	Concn. molar	Bulk	Burst Factor	Tear Factor	Breaking Length km.	Freeness C.s.f. ml.	Drainage Time sec.	Air Resistance sec.
Thorium nitrate	nil	1.54	50.5	108	8.36	342	6.2	11.9
	0.000125	1.55	49.8	113	8.37	360	6.0	10.7
	0.00025	1.62	33.4	99	6.36	553	5.1	3.4
	0.0005	1.68	22.4	76	4.70	582	4.8	2.0
	0.001	1.73	19.7	74	4.22	586	4.8	2.1
	0.002	1.76	19.8	74	4.24	592	5.0	2.2
Diff. significant at 5% level	...	0.045	1.5	9	0.31	21	0.10	1.9
Diff. significant at 1% level	...	0.062	2.1	12	0.43	29	0.14	1.3

Each value is the mean of either four or six replications depending on the experimental design used.

TABLE VII

THE INFLUENCE OF MONOVALENT CATIONS ON THE BEATING EFFECT

0.004 M sodium chloride

	Treatment	Bulk	Burst Factor	Tear Factor	Breaking Length km.	Freeness C.s.f. ml.	Air Resistance sec.
Unbeaten	A	1.69	25.6	75.0	4.84	320	6.2
	B	1.70	26.2	79.8	5.02	508	6.4
	C	1.71	24.8	67.8	4.69	509	5.6
	D	1.70	26.3	72.5	4.96	318	6.2
Diff. significant at 5% level		0.04	3.3	5.8	0.37	18	0.9
Diff. significant at 1% level		0.05	4.4	7.8	0.49	24	1.2
1125 rev.	A	1.61	34.8	78.8	5.98	327	7.1
	B	1.62	35.4	77.5	6.02	497	6.8
	C	1.58	39.0	82.8	6.41	477	6.4
	D	1.59	37.5	80.2	6.36	318	6.6
Diff. significant at 5% level		0.04	3.3	5.8	0.37	18	1.5
Diff. significant at 1% level		0.05	4.4	7.8	0.49	24	2.1
4500 rev.	A	1.50	49.6	88.0	7.84	315	12.7
	B	1.50	50.7	90.5	7.96	419	13.4
	C	1.50	53.4	91.8	8.17	426	12.6
	D	1.50	52.4	89.0	8.01	304	13.0
Diff. significant at 5% level		0.04	3.3	5.8	0.37	18	1.8
Diff. significant at 1% level		0.05	4.4	7.8	0.49	24	2.5
9000 rev.	A	1.40	60.8	90.3	9.16	256	42.3
	B	1.41	61.0	91.8	9.27	349	40.8
	C	1.38	63.7	93.8	9.50	317	41.0
	D	1.40	63.5	94.5	9.12	226	41.0
Diff. significant at 5% level		0.04	3.3	5.8	0.37	18	6.6
Diff. significant at 1% level		0.05	4.4	7.8	0.49	24	9.3
18000 rev.	A	1.32	69.6	90.0	10.02	116	378
	B	1.31	73.2	87.8	10.28	160	381
	C	1.31	73.2	89.0	10.45	164	369
	D	1.30	71.5	88.2	10.25	101	263
Diff. significant at 5% level		0.04	3.3	5.8	0.37	18	8.8
Diff. significant at 1% level		0.05	4.4	7.8	0.49	24	12.3

Treatment: A—distilled water throughout
B—electrolyte added after beating
C—electrolyte throughout
D—electrolyte washed from pulp after beating

Note: Each value is the mean of four replications.

high retention of thorium by the fiber as compared with that of other cations.

The basic formula for all electrokinetic phenomena is

$$\text{zeta-potential} = \frac{4\pi e d}{D}$$

where e is the charge per sq.cm. between the two walls of the diffuse layer d cm. apart, and D is the dielectric constant of the medium between the walls of the diffuse layer *(15)*. The addition of electrolytes will cause small changes in D and hence in the zeta-potential. It is also considered that d changes in the presence of electrolytes.

Electrokinetic Properties and the Observed Data

How can the difference in properties exhibited by the pulps when evaluated in distilled water containing different electrolytes be explained? In the first place it was found that pulps differed in their properties according to whether they were washed in distilled water or dilute acid, but the differences between as-received and water-washed pulps were not great. It is evident that the zeta-potentials of the last-mentioned pulps would not be very different, but the acid-washed pulp with a pH of about 4.5 is obviously in a very different condition. Secondly, it has been shown that the properties of a pulp vary with the concentration of the electrolyte in the water in which the pulp is beaten. The relationship between electrolyte concentration and its influence on the zeta-potential of cellulose has been discussed earlier. Such behavior is quite understandable when the changes due to electrolytes which occur in the immediate vicinity of the fiber are considered. If such a viewpoint is adopted, however, it is necessary to assume that the fibre consists of the fibre proper and its surrounding ionic "atmosphere" *(Figure 6)*. It is easy to see how the presence of electrolytes could affect freeness, as changes in the thickness of the diffuse layer d would vary the resistance to the passage of water between the pulp fibers *(15)*. (This effect is actually used to measure the zeta-potential of cellulose by applying a potential difference across a pad of pulp and measuring the rate of transfer of water through the pad.) It is also reasonable to assume that the beating of a pulp will be influenced by the ionic layer. A thick layer may aid in the protection of the fiber during beating. It is possible that there may be an optimum zeta-potential for beating. It is noteworthy that when pulp was being beaten in the Lampen mill with the higher concentrations of thorium nitrate, the mill had a very metallic sound such as is normally encountered only at low stock concentrations.

Finally, we have to consider the case where pulps were beaten in water containing sodium or aluminium chlorides and then washed with distilled water until the washings were free from electrolytes. It was possible to wash back to the distilled water condition in the case of sodium chloride but the same effect could not be attained when aluminium chloride was present. Freundlich *(16)* quotes investigations into the zeta-potentials of glass and quartz capillaries; it was found that the capillaries which had contained solutions of monovalent cations returned to their original state after washing for a long period with distilled water. With cations of higher valency the adsorption was so strong that acid treatment was required to remove them from the capillaries. It is clear that the behavior observed is similar to that encountered in washing the sodium or aluminium salts from the pulp.

All of these points indicate a close connection between the factors which influence the zeta-potential and the behavior exhibited by the pulp throughout the present investigations. It appears reasonable therefore to suggest that the effects observed are connected with the zeta-potential of the cellulose fiber and that this particular property may have to be considered along with other fiber properties when pulps are being evaluated.

Practical Aspects

The data presented raise some important practical aspects both in relation to pulp evaluation procedures and with regard to mill practice.

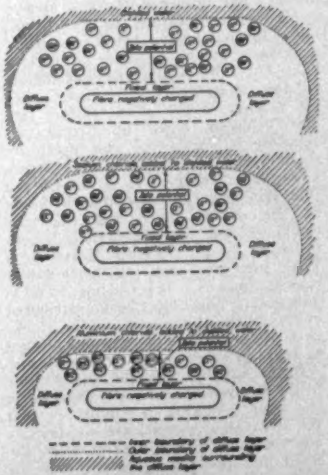

Figure 6—Digrammatic Representation of a Fiber and its Electrical Double Layer when Suspended in Distilled Water or Water Containing Electrolytes

Pulp Evaluation

It is evident that differences in the mineral content of the water supplies at different mills can give rise to different results when matched pulp samples are evaluated in the respective laboratories. As pulp is frequently bought and sold on the basis of such evaluations it is most desirable that the evaluations should be made under similar conditions. Beating procedures, sheetmaking and testing are generally carefully standardized, but the value of such precautions may be reduced unless the same care is paid towards ensuring a standard water for pulp evaluation. The solution of this problem would appear to lie in the use of mineral-free water for pulp evaluation procedures. It might be argued that commercial pulps will always contain some inorganic matter either from the cooking liquor or from the water employed to wash the pulp. These are, however, the constituent parts of the pulp as it is received for evaluation and therefore any influence which these residual materials might exert should be considered as being characteristic of the particular pulp.

It is important therefore when comparing pulp evaluation data from different sources to appreciate fully the variations which might result from differences in the water supplies. If comparable results are to be obtained, it is necessary that the process water be standardized as well as the processing and testing procedures.

Mill Applications

The effect which electrolytes exert on strength properties raises several points in normal mill practice that should be reviewed in the light of the data set out in this paper. The most important information is that relating to the presence of small amounts of cations of high valency. During the sizing of pulp, aluminium sulphate is added to the pulp suspension. It is evident from the results which have been obtained that this must cause a substantial reduction in the bursting and tensile strength of paper made from the pulp.

If papermaker's alum is indispensable to efficient sizing, then the reduction in paper strength must be accepted. On the other hand, so much waste of beating energy is involved, that a search for either an alternative sizing agent or a different technique is warranted.

The increase in strength accompanying the presence of sodium ions may be another factor of practical significance in mill operations. In many cases there will be sufficient sodium ions in the beater stock arising either from the water or as residual material from the cooking process. When this is not the case or when tri- or tetra-valent salts are present the addition of sodium salts might effect appreciable increases in the strength properties of pulps.

TABLE VIII

THE INFLUENCE OF TRIVALENT CATIONS ON THE BEATING EFFECT

0.0005 M aluminium chloride

	Treatment	Bulk	Burst Factor	Tear Factor	Breaking Length km.	Freeness C.s.f. ml.	Air Resistance sec.
Unbeaten	A	1.68	26.7	68	4.94	328	6.1
	B	1.74	22.4	64	4.34	543	4.2
	C	1.78	19.0	60	3.88	580	3.1
	D	1.79	20.6	58	3.90	516	3.4
Diff. significant at 5% level		0.028	2.6	6.6	0.31	15	0.5
Diff. significant at 1% level		0.037	3.5	8.8	0.41	20	0.8
1125 rev.	A	1.52	36.0	84	6.38	334	6.6
	B	1.66	30.1	83	5.53	530	4.7
	C	1.66	27.3	75	5.12	562	3.6
	D	1.67	28.9	74	5.38	496	4.2
Diff. significant at 5% level		0.028	2.6	6.6	0.31	15	0.5
Diff. significant at 1% level		0.037	3.5	8.8	0.41	20	0.7
4500 rev.	A	1.50	50.4	92	8.04	334	12.3
	B	1.52	39.8	88	7.02	472	8.7
	C	1.54	33.8	80	6.02	522	4.7
	D	1.55	36.2	78	6.31	464	5.5
Diff. significant at 5% level		0.028	2.6	6.6	0.31	15	1.0
Diff. significant at 1% level		0.037	3.5	8.8	0.41	20	1.3
9000 rev.	A	1.42	60.0	93	9.26	252	38.0
	B	1.43	46.9	88	7.94	383	23.2
	C	1.46	33.9	75	6.06	429	9.2
	D	1.49	39.4	81	6.52	371	9.3
Diff. significant at 5% level		0.028	2.6	6.6	0.31	15	8.2
Diff. significant at 1% level		0.037	3.5	8.8	0.41	20	11.6
18000 rev.	A	1.33	68.1	90	10.00	126	216
	B	1.34	52.3	82	8.49	238	124
	C	1.36	36.4	71	6.27	253	43
	D	1.40	42.4	80	6.83	197	38
Diff. significant at 5% level		0.028	2.6	6.6	0.31	15	81
Diff. significant at 1% level		0.037	3.5	8.8	0.41	20	114

Treatment: A—distilled water throughout
B—electrolyte added after beating
C—electrolyte throughout
D—electrolyte washed from pulp after beating

Note: Each value is the mean of four replications.

TABLE IX

ANTAGONISTIC EFFECTS OF MONO- AND TRI-VALENT CATIONS ON PULP PROPERTIES

(Washed eucalypt kraft pulp beaten for 4500 rev. in the Lampen mill)

Processing Medium	Freeness C.s.f. ml.	Bulk	Burst Factor	Tear Factor	Breaking Length km.
Distilled water	337	1.56	46.4	110	8.11
Distilled water plus NaCl (200 p.p.m.)	401	1.54	55.1	109	9.13
Distilled water plus $CeCl_3$ (50 p.p.m.)	507	1.56	43.0	99	7.70
Distilled water plus $CeCl_3$ (50 p.p.m.) and NaCl (100 p.p.m.)	482	1.53	46.1	103	8.06
Distilled water plus $CeCl_3$ (50 p.p.m.) and NaCl (200 p.p.m.)	494	1.56	48.0	106	8.45
Distilled water plus $CeCl_3$ (50 p.p.m.) and NaCl (400 p.p.m.)	494	1.54	47.3	102	8.39
Differences significant at 5% level	12.6	0.0204	1.72	4.77	0.472
Differences significant at 1% level	17.6	0.0282	2.36	6.58	0.650

Note: Each value is the mean of four replications.

Conclusions

The presence of small concentrations of electrolytes in the processing water generally has a significant effect on pulp and paper properties. The magnitude of the effect increases with the concentration of the electrolyte and with the valency of the cation. Monovalent cations cause an increase in strength properties, divalent cations have little effect, and tri- and tetravalent cations result in substantial reductions in strength. Freeness, however, is always increased by the presence of electrolytes, the effect increasing with the valency of the cation.

The similarity between the effects produced on the zeta-potential of cellulose by dilute solutions of electrolytes and those reported in this paper suggest that the latter may be related to the electrokinetic properties of the pulp.

Differences in the mineral contents of the water supplies at different laboratories may lead to different results on matched samples of a pulp. This can be avoided by the use of electrolyte-free water in pulp evaluation.

Acknowledgments

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Patent Abstracts

● In addition to abstracts on the technology of pulp, paper and related industries, miscellaneous abstracts which may provide useful information are included.

Can. 472,863—Methods for Recovering or Producing Sulfur Dioxide in Liquid Form, Particularly in Connection with Sulfite Pulp Production, or in Connection with the Saccharification of Wood Using Sulfur Dioxide as the Hydrolysing Agent, etc. Väinö Herman Somer, Lauritsala, Kaukas, Finland, assignor to one-half interest to Aktiebolaget Kaukas Fabrik. Lauritsala, Kaukas, Finland. Filed October 26, 1946—Issued April 10, 1951.

A method for recovering or producing sulfur dioxide in liquid form, dry or containing water, particularly in connection with the saccharification of wood by hydrolysis with sulfur dioxide, or with absorption or adsorption processes, etc., comprising leading the sulfur dioxide gas, or gases substantially saturated with sulfur dioxide issuing from the contributing process under pressure, maintaining this pressure substantially unchanged, and, if desirable, after previous removal of higher boiling components from the mixture (water vapor) by direct or indirect condensation and separation, into a condensing unit built for the pressure in question and so dimensioned in relation to the quantity of gas that at a small pressure gradient, as a result of and/or only after cooling in the condenser, the sulfur dioxide is continuously liquefied from the gas, the sulfur dioxide liquefied corresponding substantially in amount to the gas that flows into the condenser by reason of the pressure drop.

Can. 472,864—Methods for Increasing the Sulfur Dioxide Content of Cooking Acids used in the Manufacture of Sulfite Pulp. Väinö Herman Somer, Lauritsala, Kaukas, Finland, assignor of one-half and Tor Erik Brehmer, Järvenpää, Finland, assignor of all his interest to Aktiebolaget, Kaukas Fabrik, Lauritsala, Kaukas, Finland. Filed October 26, 1946—Issued April 10, 1951.

A method for concentrating SO_2-gases produced or obtained in cellulose or other industries in which the sulfur dioxide in a part of the oven gases such as blow-off gases, or decomposition gases is absorbed in an absorption liquid comprising a mixture of organic bases and water, the sulfur dioxide being then recovered in concentrated form by evaporation from the absorption liquid with retention of the oxidation products of SO_2 eventually occurring, characterized in that the organic base consists of 2-aminocymene.

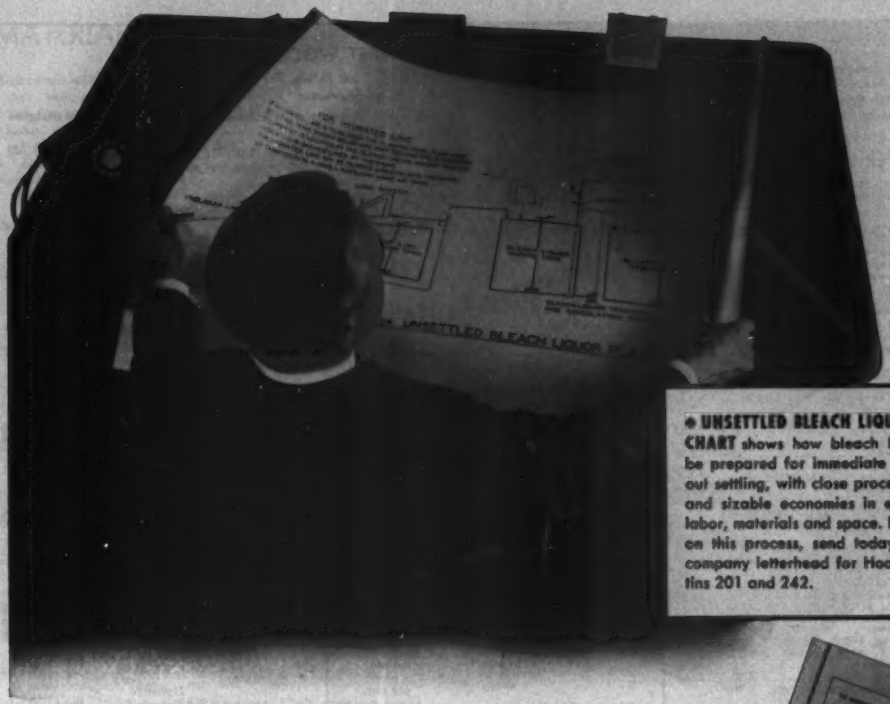
Can. 472,893 — Papermakers' Felts. Raymond J. Lee, Lockport, New York, U.S.A. Filed January 21, 1948—Issued April 17, 1951.

A papermaker's felt comprising a woven and fulled fabric having warp and filler yarns, at least one of said yarns forming a substantial portion of the felt surface and consisting of wool fibers and plastic fibers in such proportions that the plastic fibers constitute at least 5%, by weight, of the felt but less than will prevent appreciable fulling of said felt, the plastic from which said plastic fibers are made being a vinylidene chloride-vinyl chloride copolymer containing less than 10% of plasticiser and various light stabilizers, pigments, and the like.

A papermaker's felt comprising a woven and filled fabric having warp and filler yarns with the filler yarns forming a substantial portion of the felt surface and consisting of wool fibers and plastic fibers in such proportions that the plastic fibers constitute between 5% and 85%, by weight, of the felt, the plastic from which said plastic fibers are made being a vinylidene chloride-vinyl chloride copolymer containing less than 10% of plasticiser and various light stabilisers, pigments, and the like.

U.S. 2,549,060—Method of Treating Fibrous Cellulosic Materials to Impart Flame Resistance Thereto, Composition Therefor, and Products Thereof. Joseph W. Creely, East Bound Brook, N. J., assignor to American Cyanamid Company, New York, N. Y. Filed February 1, 1950—Issued April 17, 1951.

A method of imparting flame-resistance to a cellulosic textile material of the class consisting of natural celluloses, regenerated celluloses and mixtures thereof, which comprises impregnating said material with an association of an aqueous liquid composition containing ingredients comprising (1) a finely divided oxide of a metal of the group consisting of antimony, bismuth, tin and titanium and (2) a thermoplastic substance containing at least 20% by weight of combined halogen and capable of rupturing under heat at carbon-halogen bonds, the ingredients of (1) and (2) which together are designated hereinafter as (A) being employed in a weight ratio of 1 part of the former to from 0.6—20 parts of the latter, and of an aqueous liquid composition containing an ingredient comprising (B) a water-soluble, metal-free, nitrogen-containing salt of an amino phosphoric acid having an amino nitrogen atom attached directly to a phosphorus atom, which salt has a melting point of less htan 200° C., the ingredients of (A) and (B) being employed in a weight ratio of 1 part of the former to from 0.2—8 parts of the latter, the aqueous composition containing the ingredient (B) having a pH of from about 3 to about 7; heating the impregnated material at a temperature within the range of about 135°—200° C., and washing the resulting material to remove any residual water-soluble substances therefrom, the total amount of the ingredients of (A) and (B) with which the cellulosic textile material initially is impregnated being such that the finished flame-resistant textile contains from about 10% to about 75% by weight, based on the dry weight of the untreated textile, of wash-fast impregnant.



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201 Process and Equipment for Making Bleach Liquor for Use Without Settling
211 Chemistry of Bleaching Chemical Wood Pulps
214 What Do We Know About Bleaching?
236 Importance of pH and Catalysts in Bleaching Operations
242 Production and Use of Unsettled Bleach Liquor
243 Procedures and Brightness Grades in Bleaching Sulfate Pulps

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PRICES

The prices below reflect market quotations in New York at the mill level on standard grades. Does not include spot offerings.

PAPER AND BOARD

Standard News, Delivered Ports
Rolls, contract, per ton $105.00/110.00
Sheets ..... 118.00/ —

F.a.b. Mills. C.l. Frt. allowed, dock, N. Y.

Kraft— per cwt., 40# base wgt.
Standard Wrapping Rolls ..... $7.75/ —
No. 1 Wrapping Rolls 8.25/ 8.50
Standard Bag ..... 7.50/ —

Tissue— per ream 24x36 (480) 10 lbs. 2500 lbs or more

Wh. No. 1 Frd.	$1.95	/$2.25
Wh. No. 1 MG	2.10	/ 2.40
Wh. No. 1½	1.85	/ 2.15
Wh. No. 2	1.85	/ 2.15
Kraft Anti-Tar 20x30	1.85	/ 2.15
White Anti-Tar 20x30	1.95	/ —

Toilet— per case or 100 rolls—1 M sheets

Unbleached 4½x4½	$8.00/$8.25
Unbleached 4½x5	6.60/ —
Bleached 4½x4½	10.00/12.50
Bleached 4½x5	9.85/ —
Per Case of 50 rolls—2000 sheets	
Unbleached 4½x4½	$8.00/$9.75
Bleached 4½x4½	6.95/ —
Per Case of 100 rolls—1000 sheets	
Facial, 4½x5, 2-ply	$8.95/10.65

Paper Towels— per case of 3750

Wh. Jr. M'ff'd 9¼x9¼	$5.75
Br. Sr. M'ff'd 9¼x12	4.10
Br. Jr. M'ff'd 9½x9¾	3.60
Br. Jr. Spl. fold 9¼x10¾	3.65
Bichd. 7½x11, 24/25 rolls	$7.00/7.55

Manila, per cwt.

No. 1 Jute Tag, 100-lb., sheets*	$19.55/21.55
Reg. Jute M.F. 40-lb., sheets*	18.00/20.00
Wrapping Manila	8.75/10.50
Printing Manila	10.50/12.00

* Less usual allowance for rolls.

Gummed Tape— per bdl., 300 bdls. or more

90-lb. 375 ft. GSI	$7.20	/ —
60-lb. 600 ft. GSI	7.20	/ —
35-lb. 800 ft. GSI	8.28	/ —
35-lb. 500 ft. GSO	6.21	/ —

MARKET WOOD PULP

Second Quarter Contract Prices, Per Short Air-Dry Ton

	Varying freight allowances		Atlantic Ports		
	U. S.	Canadian	Swedish	Finnish	Norwegian
Groundwood	$285.00/ 90.00	$295.00/100.00			
Sulphate, Bleached	135.00/200.00	190.00/200.00	*$275.00/315.00		*225.00/ —
Sulphate, Unbl. Northn.		145.00/175.00	*250.00/295.00	$300.00/ —	
Sulphate, Unbl. Southn.					
Sulphite, Bichd. (Sftwd.)	135.00/165.00	160.00/175.00	*275.00/290.00	*235.00/ —	*225.00/ —
Sulfite, Bichd. (Hdwd.)	155.00/ —				
Sulphite, Unbichd.		150.00/160.00	*250.00/265.00	*200.00/ —	
Sulphite, Unbl'd (Glassine)		164.00/ —	*252.00/ —		
Soda, Bichd.	140.00/142.50	155.00/160.00			
Siderums, Pulping News	106.00/ —	106.00/ —			

* On dock. † Delivered. ‡ F.o.b. Shipping Point.

Boards, per ton—

Filled News	$107.50/ —
Plain Chip	105.00/107.50
Bichd. Mis. L-d. Chip	147.50/ —
White Pat. coated .020	170.00/ —
Kraft Liners 42 lb.	115.00/117.50
Kraft Curr. .009	122.50/126.00
Binders Boards	137.50/140.00

The following prices are representative distributors' resale prices.

Rag Content Bonds and Ledgers—
White, 20 lb.

Bonds	4 Cts. per cwt.
100% Rag Ex. No. 1	$70.45/$75.90
100% Rag	63.65/ —
75% Rag	48.15/ —
50% Rag	38.90/ —
25% Rag	31.65/ 33.00

Ledgers	4 Cts. per cwt.
100% Rag Ex. No. 1	$72.65/$72.80
100% Rag	63.90/ —
75% Rag	49.40/ —
50% Rag	40.30/ —
25% Rag	33.00/ 34.30

Sulphite Bonds and Ledgers
White, 20 lb.

Bonds	4 Cts. per cwt.
Watermarked	$19.00/$20.30
Plain	18.05/ 19.50

Ledgers	4 Cts. per cwt.
Watermarked	$20.30/$21.80
Plain	19.35/ 20.80

White Book

Conversion Coated	Case per cwt.
No. 1	$23.40/$24.65
No. 2	21.90/ 23.40
No. 3	20.40/ 22.40
Machine Coated	
No. 1	$18.15/$18.40
No. 2	16.15/ 16.65
Uncoated	
No. 1 Antique (Watermarked)	$18.65/$19.15
Offset	17.40/ 19.90
A Grade E. F.	17.40/ 18.15
A Grade S. C.	18.15/ 18.65
B Grade E. F.	17.65/ —
B Grade S. C.	16.90/ 18.40

‡ Indicates a price change.

WASTE PAPER MARKET

The following quotations were gathered from major dealers in each market. They are an indication of the price range in which volume tonnage was moving on the date specified. Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.)

	New York June 6	Philadelphia June 7	Boston June 16	Chicago June 1
No. 1 Mixed Paper	$18.00/ 24.00	$21.00/ 24.00	$19.00/ 21.00	$20.00/ —
Boxboard Cuts	19.00/ 25.00	21.00/ 24.00	26.00/ —	25.00/ —
Mill Wrappers	19.00/ 30.00	25.00/ 30.00	22.00/ 30.00	22.00/ —
No. 1 News	22.00/ 25.00	22.00/ 25.00	— /22.00	22.00/ —
Over-issue News	28.00/ 35.00	30.00/ 35.00	22.00/ 24.00	25.00/ —
Corrugated Containers	64.00/ 68.00	58.00/ 63.00	64.50/ 66.00	52.00/ —
New Corrugated Cuts	Nominal	60.00/ 65.00	55.00/ 65.00	62.00/ —
Double Kraft Ld. Corr. Cuts .*	115.00/120.00	105.00/120.00	120.00/140.00	120.00/ —
100% Kraft Corr. Cuts .*	140.00/165.00	125.00/135.00	130.00/170.00	140.00/ —
Used Kraft Bags .*	85.00/105.00	80.00/ 85.00	85.00/116.50	65.00/ —
No. 1 Brown Kraft Paper	70.00/ 75.00	90.00/ 95.00	90.00/110.00	65.00/ —
Super Resorted Br. Kraft .*	100.00/105.00	100.00/105.00	100.00/125.00	90.00/ —
New Br. Kraft Env. Cuts .*	160.00/180.00	160.00/175.00	160.00/180.00	150.00/ —
New Br. Kraft Cuts .*	150.00/175.00	130.00/140.00	150.00/180.00	140.00/ —
No. 1 Gdwd Shvs.	65.00/ 70.00	50.00/ 65.00	75.00/ 85.00	55.00/ —
White Newsblanks	100.00/110.00	80.00/ 90.00	90.00/100.00	80.00/ —
No. 1 Flyleaf Shvs. .*	80.00/120.00	80.00/ 85.00	95.00/110.00	100.00/ —
No. 1 Soft Wht. Shvs. .*	160.00/190.00	170.00/175.00	175.00/195.00	175.00/ —
Super Soft Wht. Shvs. .*	190.00/200.00	190.00/200.00	190.00/210.00	185.00/ —
Hd. Wht. Shvs. .*	185.00/210.00	190.00/215.00	190.00/215.00	180.00/ —
Hd. Wht. Env. Cuts .*	200.00/245.00	200.00/225.00	200.00/235.00	190.00/ —
New Manila Env. Cuts .*	140.00/150.00	160.00/165.00	140.00/165.00	115.00/ —
Col. Tab Cards .*	110.00/120.00	115.00/120.00	95.00/150.00	100.00/ —
Manila Tab Cards .*	170.00/185.00	165.00/190.00	160.00/200.00	165.00/ —
No. 1 Mixed Ledger .*	95.00/105.00	100.00/105.00	87.00/110.00	100.00/ —
White Ledger .*	130.00/140.00	125.00/130.00	125.00/140.00	125.00/ —
No. 1 Book & Mag.†	41.00/ 45.00	35.00/ 40.00	40.00/ 60.00	25.00/ —
No. 1 Rep'd. Hvy. Books‡	50.00/ 55.00	50.00/ 60.00	60.00/ 75.00	50.00/ —

* GCPR Ceiling. † Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% groundwood.

RAG MARKET

New Domestic Cotton Cuttings
OPS Ceiling Price, CPR 28
Delivered Mill Basis

Add 7½% Dealer Commission

No. 1 White Shirts	$21.00
No. 1 Unbichd. Muslins	21.00
Bichd. & Unbichd. Underwears	21.00
Bichd. Canton Flannels	21.00
No. 1 Light Silesias	16.00
No. 1 Light Prints	11.50
No. 1 Blue Overalls	14.50
Suntan Khakis	11.50

Add 10% Dealer Commission

Fancy Shirts	$10.00
Indigo Blues	10.00
Mixed Khakis	8.00
Corduroys	8.00
Cottonades	8.00
No. 1 Washables	6.50

Old Domestic Cotton Rags
(Prices to Dealers, f.o.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$5.00/$5.50
Cotton Pants & Overalls	4.25/ 5.00
Thirds and Blues, Repacked	3.75/ 4.00
No. 1 Roofing Rags	3.10/ 3.25
No. 2 Roofing Rags	2.25/ 2.35
No. 3 & 4 Roofing Rags	2.15/ 2.25
Roofing Bagging	2.15/ 2.25

Bagging
(Prices to Dealers, f.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny	$7.50/$7.75
Domestic Gunny, No. 1	$7.50/$7.75
Heavy Wool Tares	8.00/ 8.25
Foreign Manila Rope	8.00/ 8.25
Domestic Manila Rope	7.50/ 7.50
Jute Strings	7.75/ 8.00
No. 1 Sisal Strings	8.00/ 8.25
Paper Mill Tares	5.25/ 5.75
Foreign Scrap Burlap	6.00/ 6.25
Domestic Scrap Burlap	7.00/ 7.50
Austr. Wool Pouches	7.50/ 8.50
New Burlap Cuttings	7.50/ 8.00

MATERIALS

Aluminum, sulfate:			
coml. bags, wks.	cwt.	1.65	
iron-free c.l.		3.25	
Alcohol, ethyl:			
tax free, dns. c.l.	gal.	1.01	/ 1.05½
dsld. East Miss.			
Alcohol, methyl:			
Synthetic, Zone 1, dns. c.l. ft. slld.	gal.	.44	
Casein, acid-proc.:			
dom. sh. pt. c.l.	lb.	.40	/ .41½
imp. ex. dock	lb.	.31½/	.40
Caustic soda:			
c.l. wks. solid, 76%, cwt.		3.35	
flak. & grd. 100-lb. drums		3.75	
liquid 50% tanks		2.55	
liquid 70% tanks		2.65	
China clay:			
dom. air-float. filler, c.l. wks.	ton	10.00	
water-washed, lump, filler		11.00	
coating		17.60	/30.50
imported, ex whse.	short ton	15.30	/28.35
Chlorine:			
single-unit tanks, works	cwt.	2.70	
multi-unit	cwt.	3.26	/ 4.40
Formaldehyde:			
USP, ink. dns, c.l. wks.	lb.	.0625/	.0675
l.c.l., E. wks.		.0675/	.0725
Fuel oil:			
Bunker C, No. 6 Cal. hvy tanks, refinery	bbl.	1.95	/ 2.15
light	bbl.	2.00	/ 2.25
Hydrogen peroxide:			
USP, 35% cbys. E. of Miss.	lb.	.23½/	.26½
Lime:			
hydrated, bags, wks. Buffalo	ton	13.50	
Rosin:			
B gum, drms, c.l. Savan.	cwt.	8.00	
G, H, I, K	cwt.	8.79	/ —
FF, wood, dn.	cwt.	7.30	/ —
Rosin size:			
70%, gum & pale grds, tank cars, south, sh. pt.	cwt.	6.80	/ 7.00
Salt cake:			
dns. bulk, c.l. wks.	ton	17.00	
wks. frt. all	ton	20.00	/22.00
Soda ash:			
light, 58%, bags, wks.		1.30	
bulk	cwt.	1.20	
Sodium silicate 40°:			
tarbid. c.l. wks.	cwt.	1.30	/
l.c.l. wks.		1.60	/ 1.85
Sodium peroxide:			
dns. c.l. E. of Miss.	lb.	.21	
l.c.l. do.	lb.	.21½/	.22
Soybean, protein:			
chem. ind, wks. c.l. Cinn. and Chic.	lb.	.24	/ —
Sulfuric acid:			
60° Be. cbys. c.l. wks.	cwt.	1.75	/ —
l.c.l. wks.	cwt.	2.05	/ 2.85
Sulfur:			
crude, c.l. mines, contract,	long ton	21.00	/22.00
f.o.b vessels Gulf		22.50	/23.50
Export, f.o.b. Gulf		25.00	
Sulfur dioxide:			
liquid, comL cyl. wks.	lb.	.09	
multi-unit cars	lb.	.0825	
Starches:			
pearl corn, bags, c.l. wks.	cwt.	6.02	/ —
white dextrines, c.l. wks.	cwt.	7.41	/ —
potato, Idaho, c.l. wks.	cwt.	5.50	/ —
potato, Maine, c.l. wks.	cwt.	5.75	/ —
tapioca, conv. dextrines	cwt.	7.75	/ 8.50
low, Siam, on dock N. Y.		5.75	/ 6.00
Talc:			nominal
domestic, 50-lb. sacks, c.l. wks.	ton	25.00	/30.00
Titanium dioxide:			
anatase, c.l. dsld., bags	lb.	.21	/ .21½
l.c.l. dsld.	lb.	.22	/ .22½
rutile, c.l. dsld.	lb.	.23	/ .23½
l.c.l. dsld.	lb.	.24	/ .24½

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Bids and Awards

GPO 3rd Quarter, 1951 Paper Needs

WASHINGTON — Bids were received on June 11 by the Joint Congressional Committee on Printing for paper for the use of the Government Printing Office for a three-month period beginning July 1, 1951. Awards, announced June 18, are indicated by asterisks (*) before the names of the successful bidders in the tabulation herewith.

Newsprint

No. 1—4,000,000 lbs., 24x36—64; rolls, 19, 24, 36, 38 and 48 ins. wide, 36 inches in diameter (3-inch fibre cores); min. order, 40,000 lbs.

Machine-Finish Book

No. 2—775,000 lbs., 25x38—70; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 40,000 lbs.
* Mead Sales Co. ..... .1225c
Wilcox, Walter Furlong Paper Co. .1346c
Walker Goulard Plehn Co. ..... .1453c
Walker Goulard Plehn Co. ..... .1394c

No. 6—200,000 lbs., 25x38—70; rolls, 28½ ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order 40,000 lbs.
* Mead Sales Co. ..... .11c
Mudge Paper Co. ..... .1317c
Wilcox, Walter Furlong Paper Co. .1259c
Walker Goulard Plehn Co. ..... .1347c
Walker Goulard Plehn Co. ..... .1288c

No. 7—100,000 lbs., 25x38—70; rolls, 19 and 38 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
* Mead Sales Co. ..... .11c
Mudge Paper Co. ..... .1317c
Wilcox, Walter Furlong Paper Co. .1259c
Walker Goulard Plehn Co. (Total quantity, 600,000 lbs.) .. .1347c
Walker Goulard Plehn Co. ..... .1288c

No. 9—180,000 lbs., 25x38—70; rolls, 24, 36 and 48 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
* Mead Sales Co. ..... .11c
Mudge Paper Co. ..... .1317c
Wilcox, Walter Furlong Paper Co. .1259c
Walker Goulard Plehn Co. ..... .1347c
Walker Goulard Plehn Co. ..... .1288c

English-Finish Book

No. 10—250,000 lbs., 25x38—90; flat, cut any size, min. width 24 ins., max. width 48 ins., max. length 56 ins.; min. order, 20,000 lbs.
* Stanford Paper Co. ..... .1352c

Machine-Finish Book End Paper

No. 17—20,000 lbs., 25x38—160; flat, cut 38x50 ins.; min. order, 20,000 lbs.

Offset Book

No. 18-18a—300,000 lbs., 25x38—80; flat, cut any size, min. width 24 ins., max. width 48 ins.; the grain to run lengthwise of the sheet; min. order, 40,000 lbs.

No. 19-19a—3,000,000 lbs., 25x38—100; flat, cut any size, min. width 24 ins., max. width 48 ins.; the grain to run lengthwise of the sheet; min. order, 40,000 lbs.
* Central Ohio Paper Co. (450,000 lbs.) ..... .1317c

No. 20-20a—200,000 lbs., 25x38—120; flat, cut any size, min. width 24 ins., max. width 48 ins.; the grain to run lengthwise of the sheet; min. order, 40,000 lbs.

Antique Book

No. 21—130,000 lbs., 25x38—90; flat, cut 32x42, and 38x50; min. order, 40,000 lbs.
* Stanford Paper Co. ..... .1379c

No. 22—375,000 lbs., 25x38—120; flat, cut 32x42, 38x48, and 38x50 ins.; min. order, 20,000 lbs.
* Stanford Paper Co. ..... .1379c

50% Antique Book

No. 26—20,000 lbs., 25x38—80; flat, cut 32x48, and 38x48 ins.; min. order, 20,000 lbs.

Water Resistant (Test) Book

No. 50—100,000 lbs., 25x38—120; flat, cut 32x42 and 35x45 ins.; min. order, 40,000 lbs.
* Stanford Paper Co. ..... .1960c

Supercalendered Book

No. 52—50,000 lbs., 25x38—90; flat, cut any size, min. width 24 ins., max. width 48 ins.; min. order, 40,000 lbs.
* Mead Sales Co. ..... .1235c
Mudge Paper Co. ..... .1365c
Wilcox, Walter Furlong Paper Co. .1306c

No. 53—620,000 lbs., 25x38—90; rolls, 28½ and 38 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
* Mead Sales Co. (220,000 lbs.) ..... .1110c
Mudge Paper Co. ..... .1285c
* R. P. Andrews Paper Co. (400,000 lbs.) ..... .848c
Wilcox, Walter Furlong Paper Co. .1226c

Coated Book

No. 34—900,000 lbs., 25x38—160; flat, cut any size, min. width 24 ins., max. width 48 ins.; min. order, 40,000 lbs.
Walker Goulard Plehn Co. ..... .1581c
Walker Goulard Plehn Co. ..... .1597c
* Frank Parsons Paper Co. (200,000 lbs.) ..... .1180c

No. 35—200,000 lbs., 25x38—120; flat, cut any size, min. width 24 ins., max. width 48 ins.; min. order, 40,000 lbs.
R. P. Andrews Paper Co. ..... .1187c
Walker Goulard Plehn Co. ..... .1581c
Walker Goulard Plehn Co. ..... .1597c
* Frank Parsons Paper Co. (200,000 lbs.) ..... .1180c

No. 36—100,000 lbs., 25x38—100; rolls, 28½ and 38 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
Walker Goulard Plehn Co. ..... .1581c
Walker Goulard Plehn Co. ..... .1597c
(Rejected)

No. 38—320,000 lbs., 25x38—140; flat, cut 32x42, 38x48 and 39x50 ins. and 42x64 ins.; the grain to run lengthwise of the sheet; min. order, 40,000 lbs.
Mudge Paper Co. ..... .1582c
* Bermingham & Prosser Paper Co. (190,000 lbs. only) ..... .1635c
Stanford Paper Co. ..... .1725c
* Walker Goulard Plehn Co. (130,000 lbs.) ..... .1655c

Litho Coated Book

No. 41—220,000 lbs., 25x38—140; flat, cut 32x42, 35x45, 38x48, 39x50, and 41x52 ins.; the grain to run lengthwise of the sheet; min. order, 40,000 lbs.
Stanford Paper Co. ..... .1805c
* Walker Goulard Plehn Co. ..... .1699c
* Walker Goulard Plehn Co. ..... .1711c

Chemical Wood Mimeograph White and Colored

No. 44—770,000 lbs., white, No. 40; flat, cut 28½x34½, 32½x42½, 38x48½ ins. Grain size 28½x34½ ins. to run the 28½ inch way; size 32½x42½ ins. to run the 42½ inch way; size 38x48½ ins. to run the 38 inch way; min. order, 40,000 lbs.
* Barton, Duer & Koch Paper Co. (426,000 lbs.) ..... .1325c

No. 45—90,000 lbs., blue, buff, green, pink and yellow, No. 40; flat, cut 32½x42½, and 38x48½ ins. Grain: size 32½x42½ ins. to run the 42½ inch way; size 38x48½ ins. to run the 38 inch way. Min. order, one color, 10,000 lbs.

25% Mimeograph

No. 46—200,000 lbs., No. 40; flat, cut 28½x34½, 32½x42½, 38x48½, and 40½x42½ ins. Grain: Size 28½x34½ ins. to run the 28½ inch way; sizes 32½x42½ and 40½x42½ ins. to run the 42½ inch way; size 38x48½ ins. to run the 38 inch way; min. order, 40,000 lbs.
Howard Paper Mills, Inc. (50,000 lbs. only) ..... .2094c
* Walker Goulard Plehn Co. ..... .1819c

Duplicator Copy Paper Liquid Process, White and Colored

No. 47a—100,000 lbs., white; No. 40; flat, cut 32x42, 34x44 and 40x52½ ins.; the grain to run lengthwise of the sheet; min. order, 40,000 lbs.
* Walker Goulard Plehn Co. ..... .1735c

No. 48a—35,000 lbs., pink, yellow, green and blue, No. 40; flat, cut 32x42, 34x44 and 40x52½ ins.; the grain to run lengthwise of the sheet; min. order, 20,000 lbs.

Chemical Wood Writing White and Colored

No. 51-51a—100,000 lbs., white, No. 26; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 40,000 lbs.

No. 52-52a—2,500,000 lbs., white, No. 32; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 40,000 lbs.

No. 53-53a—4,000,000 lbs., white, No. 40; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 40,000 lbs.
* Whitaker Paper Co. (800,000 lbs only) ..... .13c
* R. P. Andrews Paper Co. (2,250,000 lbs.) ..... .1205c
* Barton, Duer & Koch Paper Co. (500,000 lbs.) ..... .1355c

No. 54-54a—890,000 lbs., white, No. 32; rolls, min. width 16 ins., max. width 48 ins., 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
* Mead Sales Co. ..... .1250c

No. 55-55a—350,000 lbs., white, No. 40; rolls, min. width 16 ins., max. width 48 ins., 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
Mead Sales Co. ..... .1190c
* R. P. Andrews Paper Co. ..... .1058c

No. 56-56a—40,000 lbs., blue, buff, green, pink, salmon and yellow, No. 26; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, one color, 10,000 lbs.

No. 57-57a—500,000 lbs., blue, buff, green, pink, salmon and yellow, No. 32; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, one color, 10,000 lbs.

No. 58-58a—400,000 lbs., blue, buff, green, pink, salmon and yellow, No. 40; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, one color, 10,000 lbs.

No. 59-59a—30,000 lbs., yellow, No. 32; rolls, 38 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 20,000 lbs.
* Mead Sales Co. ..... .1350c

No. 60—45,000 lbs., white, No. 32; rolls, 36-in. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.

No. 60—50,000 lbs., yellow, No. 32; rolls, 38-in. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 20,000 lbs.

No. 61—130,000 lbs., No. 24; rolls, 22 ins. wide, 34 to 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.

No. 62—80,000 lbs., white, No. 30; rolls, 22 ins. wide, 34 to 36 ins. in diameter (3-inch fiber cores); min. order, 20,000 lbs.

No. 63—60,000 lbs., blue, green, pink, yellow, buff, cherry and salmon, No. 24; rolls, 22 ins. wide, 34 to 36 ins. in diameter (3-inch fiber cores); min. order, one color, 10,000 lbs.

White Chemical Wood Writing

No. 64—100,000 lbs., No. 32; rolls, 38 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.

50% Lithograph-Finish Map

No. 70—30,000 lbs., No. 32; flat, cut any size, min. width 22 ins., max. width 48 ins.; the grain to run lengthwise of the sheet; min. order, 10,000 lbs.

No. 71—60,000 lbs., No. 40; flat, cut any size, min. width 22 ins., max. width 48 ins.; the grain to run lengthwise of the sheet; min. order, 10,000 lbs.
* Barton, Duer & Koch Paper Co. (30,000 lbs.) ..... .3010c

No. 75—36,000 lbs., No. 56; flat, cut any size, min. width 22 ins., max. width 48 ins.; the grain to run lengthwise of the sheet; min. order, 10,000 lbs.

High Wet Strength Map

No. 78—1,250,000 lbs., No. 48; flat, cut any size, min. width 22 ins., max. width 48 ins.; the grain to run lengthwise of the sheet (omit ream markers); min. order, 10,000 lbs.

Chemical Wood Manifold White and Colored

No. 83—140,000 lbs., white, No. 18; flat, cut 21x32, 28x34, 32x42, and 34x44 ins.; min. order, 10,000 lbs.
* Frank Parsons Paper Co. ..... .2074c

No. 84—20,000 lbs., white, No. 18; rolls, 22 ins. wide, 30 ins. in diameter (3-inch fiber cores); min. order, 20,000 lbs.

No. 85—20,000 lbs., blue, buff, cherry, green, pink, salmon and yellow, No. 18; flat, cut 28x34, 32x42, and 34x44 ins.; min. order, one color, 5,000 lbs.

50% Manifold, White and Colored

No. 86—10,000 lbs., white, No. 14; flat, cut 32x42 in.; min. order, 10,00 lbs.

No. 87—150,000 lbs., white, No. 18; flat, cut 21x32, 28x34, 32x42, and 34x44 ins.; min. order, 10,000 lbs.
* Stanford Paper Co. (120,000 lbs.) ..... .4864c

No. 89—20,000 lbs., blue, buff, cherry, green, pink, salmon and yellow, No. 18; flat, cut 28x34, 32x42, and 34x44 ins.; min. order, one color, 5,000 lbs.

50% White Glazed Manifold

No. 91—25,000 lbs., No. 16; flat, cut 32x42 ins.; min. order, 20,000 lbs.
* Barton, Duer & Koch Paper Co. . .5075c

Chemical Wood Bond, White

No. 102—290,000 lbs., white, No. 40; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 40,000 lbs.
* R. P. Andrews Paper Co. (160,000 lbs.) ..... .1510c

Chemical Wood White Mimeograph Bond

No. 195—105,000 lbs., white, No. 26; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 10,000 lbs.
* Barton, Duer & Koch Paper Co. (50,000 lbs.) ..... .3650c

25% Bond, White and Colored

No. 197—750,000 lbs., white, No. 32; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 40,000 lbs.
* Howard Paper Mills (200,000 lbs. only) ..... .2406c

No. 169—1,560,000 lbs., No. 40; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, 20,000 lbs.
* Howard Paper Mills (250,000 lbs. only) ..... .2300c

No. 112—20,000 lbs., medical form pink, green, yellow, cherry, No. 32; rolls, 36 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 10,000 lbs.

No. 114—165,000 lbs., blue, buff, cherry, green, pink, salmon, and yellow, No. 32; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, one color, 10,000 lbs.
* Howard Paper Mills ..... .2504c

No. 115—50,000 lbs., blue, buff, cherry, green, pink, salmon and yellow, No. 40; flat, cut any size, min. width 21 ins., max. width 48 ins.; min. order, one color, 10,000 lbs.

25% Opacified Bond Paper

No. 116—100,000 lbs., white, cut 32x42, 38x46, and 38x49½ ins.; min. order, 40,000 lbs.
* Barton, Duer & Koch Paper Co. (50,000 lbs.) ..... .3315c

No. 116—40,000 lbs., 29x41 ins., buff, No. 32; flat; min. order, 20,000 lbs.

50% White Bond

No. 122—10,000 lbs., white, No. 40; flat, cut any size, min. width 21 ins., max. width 34 ins.; min. order, 10,000 lbs.

100% White Bond

No. 136—10,000 lbs., No. 40; flat, cut any size, min. width 16 ins., max. width 38 ins.; min. order, 2,000 lbs.
Barton, Duer & Koch Paper Co. . .4910c
R. P. Andrews Paper Co. ..... .4915c
* Wilcox, Walter Furlong Paper Co. .4911c

Chemical Wood White Ledger

No. 150—550,000 lbs., No. 48; flat, cut any size, min. width 17 ins., max. width 48 ins.; min. order, 20,000 lbs.
* R. P. Andrews Paper Co. (330,000 lbs.) ..... .1610c

No. 151—110,000 lbs., No. 64; flat, cut any size, min. width 17 ins., max. width 48 ins.; min. order, 10,000 lbs.
* R. P. Andrews Paper Co. ..... .1610c

No. 152—140,000 lbs., No. 88; flat, cut any size, min. width 17 ins., max. width 48 ins.; min. order, 10,000 lbs.

25% Ledger, White and Colored

No. 154—160,000 lbs., white, No. 48; flat, cut 28x34, 32x42, 34x44, and 38x48 ins.; min. order, 10,000 lbs.
* Howard Paper Mills, Inc. ..... .2406c

No. 155—160,000 lbs., white, No. 64; flat, cut 28x34, 32x42, 34x44, and 38x48 ins.; min. order, 10,000 lbs.

No. 156—55,000 lbs., white, No. 88; flat, cut 28x34, 32x42, 34x44, and 38x48 ins.; min. order, 10,000 lbs.

No. 157—50,000 lbs., blue, buff, cherry, green, pink, salmon, and yellow, No. 64; flat, cut 34x44 ins.; min. order, one color, 10,000 lbs.

No. 153—20,000 lbs. blue, buff, cherry, green, pink, salmon, and yellow, No. 88; flat, cut 34x44 ins.; min. order, one color, 10,000 lbs.

100% White Ledger

No. 178—10,000 lbs., No. 88; flat, cut 22½x31 and 34x44 ins.; min. order, 10,000 lbs.
* Barton, Duer & Koch Paper Co. . .5050c
R. P. Andrews Paper Co. ..... .5015c

Chemical Wood, White and Colored Index

No. 182—200,000 lbs., white, 25½x30½—220; flat, cut 32x42 and 34x44 ins., with projecting colored-paper marker between each 100 sheets; min. order, 10,000 lbs.
* Whitaker Paper Co. ..... .12c

No. 184—20,000 lbs., white, 25½x30½—300; flat, cut 34x44 ins., with projecting colored-paper marker between each 100 sheets; min. order, 10,000 lbs.

No. 185—70,000 lbs., buff, 25½x30½—220; flat, cut 32x42 ins., with projecting colored-paper marker between each 100 sheets; min. order, 20,000 lbs.
* Whitaker Paper Co. ..... .1275c

50% Index, White and Colored

No. 188—120,000 lbs., white, 25½x30½—220; flat, cut 32x42, 32x48 and 34x44 ins., with projecting colored-paper marker between each 100 sheets; min. order, 10,000 lbs.
* Barton, Duer & Koch Paper Co. . .2744c
Frank Parsons Paper Co. ..... .2788c

No. 189—40,000 lbs., white, 25½x30½—280; flat, cut 32x42 and 34x44 ins., with projecting colored-paper marker between each 100 sheets; min. order, 10,000 lbs.
* Barton, Duer & Koch Paper Co. . .2744c

No. 191—150,000 lbs., blue, buff, cherry, fawn, green, pink, salmon, and yellow; 25½x30½—220; flat, cut 34x44 ins., with projecting colored-paper marker between each 100 sheets; min. order, one color, 10,000 lbs.
Barton, Duer & Koch Paper Co. . .2844c
* Frank Parsons Paper Co. ..... .2850c

No. 192—40,000 lbs., blue, buff, cherry, fawn, green, pink salmon, and yellow; 25½x30½—280; flat, cut 34x44 ins., with projecting colored-paper marker between each 100 sheets; min. order, one color, 10,000 lbs.
* Barton, Duer & Koch Paper Co. . .2844c

100% White Index

No. 196—40,000 lbs., 25½x30½—250; flat, cut 20½x30 ins.; min. order, 20,00 lbs.
* Barton, Duer & Koch Paper Co. . .4975c
R. P. Andrews Paper Co. ..... .5015c

Coated Cover, White and Colored

No. 200—40,000 lbs., white, 20x26—120; flat, cut 26½x41 and 34x44 ins.; the grain to run lengthwise of the sheet; min. order, 10,000 lbs.
* Birmingham & Prosser Paper Co. .1825c

Antique-Finish Cover, White and Colored

No. 203—70,000 lbs., 20x26—100; blue, buff, dawn, quaker drab, terra cotta, gray, brown, green, gobelin blue, granite, tea, and canary; flat, cut 25½x39 inches; min. order, one color, 10,000 lbs.
Whitaker Paper Co. ..... .1475c
(Rejected)

Cloth Lined Cover, White and Colored

No. 205—5,000 sheets, white, 20x26—72; flat, cut 26x40½ ins.; min. order, one color, 5,000 sheets.

No. 205—5,000 sheets, white 20x26—73; flat, cut 36x38 ins.; min. order, one color, 5,000 sheets.
Stanford Paper Co. (Per M Sheets) ..... .38410c
Barton, Duer & Koch Paper Co.

CHECK VACUUM PUMPS ON THESE 5 POINTS

Whether for unit installations or central systems, be sure you obtain these basic essentials for successful performance of vacuum pumps:

1. **LOW POWER CONSUMPTION**—because units are recommended, either single or compound, to operate at the most efficient point.
2. **NEGLIGIBLE FRICTION LOSSES**—no contact between impellers or impellers and casings.
3. **HIGHER SPEEDS**—permitting direct connection to standard motors, saving first cost, space and weight.
4. **FLEXIBILITY**—to meet varying demands; suction automatically overcomes resistance in system.
5. **DEPENDABILITY**—long-time, attention-free operation, due to simplified design and construction.

Because of strict adherence to these 5 requirements, R-C Cycloidal Vacuum Pumps have long been favorites for paper mill operation.

Roots-Connersville Blower Corporation
510 River Avenue, Connersville, Indiana

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

(Per M Sheets) ..... .385c
Whitaker Paper Co.
(Per M Sheets) ..... .45600c

No. 205—8,000 sheets, brown or quaker drab, 20x26—72; flat, cut 36x38 ins.; min. order, one color, 5,000 sheets.

50% Laid Cover, Colored

No. 206—20,000 lbs., blue, cream, white, gray, and green; 20x26—130; flat, cut 25½x39 and 28x41 ins.; min. order, one color, 2,000 lbs.
* Frank Parsons Paper Co. ..... .28c

Chemical Wood Manila

No. 213—15,000 lbs., 24x36—140; flat, cut 32x42 ins.; min. order, 10,000 lbs.

Rope Manila

No. 215—10,000 lbs., 24x36—160; rolls, 48 ins. wide (3-inch fiber cores); min. o der, 5,000 lbs.
Paper Corp. of U. S. ..... .3844c
* R. P. Andrews Paper Co. ..... .3471c

No. 216—5,000 lbs., 24x36—280; rolls, 48 ins. wide (3-inch fiber cores); min. order, 5,000 lbs.
Paper Corp. of U. S. ..... .3844c
* R. P. Andrews Paper Co. ..... .3471c

Drumhead Manila

No. 217—10,000 lbs., 24x36—280; flat, cut 32x42 ins.; min. order, 5,000 lbs.
Paper Corp. of U. S. ..... .3944c
* R. P. Andrews Paper Co. ..... .3523c

No. 2 Kraft

No. 218—15,000 lbs., 24x36—80; flat, cut any size; max. length 56 ins., in bundles wrapped and tied; min. order, 10,000 lbs.
* Hawthorne Paper Co. ..... .986c

No. 218—35,000 lbs., 24x36—100; flat, cut any size; max. length 56 ins., in bundles wrapped and tied; min. order, 10,000 lbs.
* Hawthorne Paper Co. ..... .986c

No. 218—50,000 lbs., 24x36—120; flat, cut any size; max. length 56 ins., in bundles wrapped and tied; min. order, 10,000 lbs.
* Hawthorne Paper Co. ..... .986c

No. 218—35,000 lbs., 24x36—140; flat, cut any size; max. length 56 ins., in bundles wrapped and tied; min. order, 10,000 lbs.
* Hawthorne Paper Co. ..... .986c

No. 218—30,000 lbs., 24x36—160; flat, cut any size; max. length 56 ins., in bundles wrapped and tied; min. order, 10,000 lbs.
* Hawthorne Paper Co. ..... .986c

No. 219—5,000 lbs., 24x36—80; cut any size, folded (25 sheets per fold), in wrapped bundles; min. order, 5,000 lbs.

No. 219—50,000 lbs., 24x36—100; cut any size, folded (25 sheets per fold), in wrapped bundles; min. order, 5,000 lbs.

No. 219—15,000 lbs., 24x36—120; cut any size, folded (25 sheets per fold), in wrapped bundles; min. order, 5,000 lbs.

No. 219—20,000 lbs., 24x36—160; cut any size, folded (25 sheets per fold), in wrapped bundles; min. order, 5,000 lbs.

No. 220—30,000 lbs., 24x36—70; 9 and 11 ins. wide, min. 22 ins., max. 24 ins. in diameter; rolls, wound on wooden plugs, 1¾-inch hole, or on 3-inch fiber core as may be specified with the order; min. order, 5,000 lbs.

No. 220—10,000 lbs., 24x36—100; 36 and 48 ins. wide, min. 28 ins., max. 30 ins. in diameter; rolls, wound on wooden plugs, 1¾-inch hole, or on 3-inch fiber core as may be specified with the order; min. order, 5,000 lbs.

No. 220—5,000 lbs., 24x36—140; 36 and 48 ins. wide, min. 28 ins., max. 30 ins. in diameter; rolls, wound on wooden plugs, 1¾-inch hole, or on 3-inch fiber core as may be specified with the order; min. order, 5,000 lbs.

No. 220—20,000 lbs., 24x36—160; 36 and 48 ins. wide, min. 28 ins., max. 30 ins. in diameter; rolls, wound on wooden plugs, 1¾-inch hole, or on 3-inch fiber core as may be specified with the order; min. order, 5,000 lbs.

White Gummed

No. 252—300,000 sheets (ungummed), No. 36; flat, cut 22x34 ins.; min. order, 25,000 sheets.
* Bulkley Dunton & Co. ..... .3792c
Whitaker Paper Co. ..... .2918c
Old Dominion Paper Co. ..... .28966c
Paper Corp. of U. S. ..... .2916c
Mudge Paper Co. ..... .2812c
Bermingham & Prosser Co. ..... .2913c
R. P. Andrews Paper Co. ..... .2913c
Stanford Paper Co. ..... .3040c

25% Blotting, White

No. 254—10,000 lbs., 19x24—160; flat, cut 19x24 ins. in wrapped bundles; min. order, 10,000 lbs.
Bulkley Dunton & Co. ..... .2519c
* Whitaker Paper Co. ..... .2530c
Marquette Paper Co. ..... .25c
R. P. Andrews Paper Co. ..... .2350c

Desk Blotting, Colored

No. 255—40,000 lbs., light green, 19x24—200; flat, cut 19x24 ins., in wrapped bundles and tied; min. order, 10,000 lbs.
Bulkley Dunton & Co. ..... .1624c
Bulkley Dunton & Co. ..... .1665c
* Whitaker Paper Co. ..... .1575c
Garrett Buchanan Co. ..... .16c
Marquette Paper Co. ..... .1650c
Marquette Paper Co.
(Orders of 40,000 lbs.) ..... .16c
Bermingham & Prosser Co. ..... .1645c
Central Ohio Paper Co. ..... .1650c
R. P. Andrews Paper Co. ..... .1575c
Stanford Paper Co. ..... .1648c

High-Finish Chemical Wood Manila Tag

No. 271—100,000 lbs., 24x36—280; flat, cut 28x34 and 38x48 ins.; min. order, 20,000 lbs.

Jute Tag

No. 281—15,000 lbs., 22½x28½—280; flat, cut 34x44 ins.; min. order, 10,000 lbs.
Paper Corp. of U. S. ..... .2479c
* R. P. Andrews Paper Co. ..... .2355c

Manila Board

No. 282—10,000 lbs., 23½x28½—400; flat, cut 22x34 ins., with projecting colored-paper marker between each 100 sheets; min. order, 10,000 lbs.
Paper Corp. of U. S. ..... .1235c

White Litho-Coated One-Side Cardboard

No. 300—10,000 sheets; flat, cut 34x57 ins.; the grain to run lengthwise of the sheet; min. order, 10,000 sheets.
Walker Goulard Plehn Co.
(Per M Sheets) $137.80

No. 301—40,000 sheets; white, flat, 22x34 ins., 4-ply, each 100 sheets fully banded; min. order, 10,000 sheets.
Whitaker Paper Co. $40.00
* R. P. Andrews Paper Co.
(Per M Sheets) $40.00
Walker Goulard Plehn Co. $58.65
Walker Goulard Plehn Co. $62.65

No. 302—5,000 sheets; white, flat, 22x34 ins., 4-ply, each 100 sheets fully banded; min. order, 5,000 sheets.
Whitaker Paper Co. $89.00
* R. P. Andrews Paper Co.
(Per M Sheets) $89.00
Walker Goulard Plehn Co. $84.60
Walker Goulard Plehn Co. $88.60

Railroad Board, White and Colored

No. 304—5,000 sheets, ash gray, green, orange, and red; flat, 22x34 ins., 4-ply, each 100 sheets fully banded; min. order, one color, 5,000 sheets.
Walker Goulard Plehn Co. $62.00
(Rejected)
* Walker Goulard Plehn Co.
(Per M Sheets) $66.00

No. 305—10,000 sheets; buff, flat, 22x28 ins., 14-ply, each 50 sheets fully banded; min. order, 5,000 sheets.

Wood Cardboard, Colored

No. 306—100,000 lbs., buff, 22½x28½—150; rolls, 20 and 23 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, 40,000 lbs.
* Paper Corp. of U. S. ..... .1118c
Barton, Duer & Koch Paper Co. . .12c
Barton, Duer & Koch Paper Co. . .1250c

No. 307—30,000 lbs., buff, 22½x28½—150; flat, cut 32x42 ins.; min. order, 20,000 lbs.
* Paper Corp. of U. S. ..... .1235c
Barton, Duer & Koch Paper Co. .1325c

No. 308—20,000 lbs., melon, 22½x28½—184; flat, cut 20x30 ins.; min. order, 10,000 lbs.
* Barton, Duer & Koch Paper Co. .1375c

No. 309—50,000 lbs., blue, buff, green, melon, pink and yellow; 23½x28½—184; rolls, 20 ins. wide, 36 ins. in diameter (3-inch fiber cores); min. order, one color, 20,000 lbs.
* Barton, Duer & Koch Paper Co. . .13c

Chemical Wood Tan Board

No. 310—120,000 lbs., 22½x28½—200; flat, cut 25x38, 28x38, and 34x44 ins.; min. order, 10,000 lbs.
Paper Corp. of U. S. ..... .1861c
* R. P. Andrews Paper Co. ..... .18c

United States Postal Card Paper

No. 325—7,500,000 lbs., 22½x28½—188; rolls, 33 ins. wide, 36 ins. in diameter (6-inch iron or metal capped returnable fiber cores); min. order, 40,000 lbs.
* Whitaker Paper Co.
(1,600,000 lbs.) ..... .990c
* R. P. Andrews Paper Co.
(2,400,000 lbs. only) ..... .906c
* Frank Parsons Paper Co.
(1,500,000 lbs.) ..... .9273c

No. 327—120,000 lbs., 22½x28½—188; rolls, 22 ins. wide, 36 ins. in diameter (6-inch iron or metal capped returnable fiber cores); min. order, 40,000 lbs.
Whitaker Paper Co. ..... .990c

Pressboard, Colored

No. 351—10,000 sheets; red, flat, cut 30x36 ins., thickness .0140 in.; min. order, 5,000 sheets.
R. P. Andrews Paper Co.
(Per 100 Sheets) $18.59

Newsboard

No. 360—200,000 lbs., 26x38; No. 100; flat, cut any size, min. width 21 ins., max. width 40 ins. (To be guillotine-trimmed square on four sides.) Min. order, 10,000 lbs.
Whitaker Paper Co. ..... .603c
Resolute Paper Products Co. ..... .630c
Old Dominion Paper Co. ..... .6084c
Paper Corp. of U. S. ..... .0606c
Mudge Paper Co. ..... .611c
Stanford Paper Co. ..... .618c
R. P. Andrews Paper Co. ..... .05c

Binder's Board, No. 1 Quality

No. 366—50,000 lbs., No. 1, 25¼x30¼ ins., Nos. 16, 18, 20, 25, 30, and 40; flat, to trim 25x30 ins.; min. order, 5,000 lbs.
R. P. Andrews Paper Co. ..... .07c
R. P. Andrews Paper Co. 7.18c
R. P. Andrewc Paper Co. 7.39c
R. P. Andrews Paper Co. 7.52c

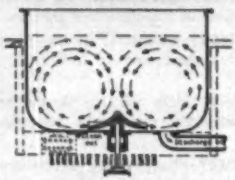
No. 367—15,000 lbs., No. 1, 25¼x30¼ ins., Nos. 12 and 20; flat, to trim 24x44 ins.; min. order, 5,000 lbs.
Whitaker Paper Co.
Carload lots ..... .7291c
R. P. Andrews Paper Co. 7.39c
R. P. Andrews Paper Co. 7.52c

Chestnut Cover Board

No. 369—100,000 lbs., 25¼x30¼ ins., Nos. 17, 19, 21, 25, 31, and 41; flat, to trim 25x30 ins.; min. order, 5,000 lbs.
Mead Board Sales Co., Inc. ..... .07325c
Mead Board Sales Co. 6.975c
Mead Board Sales Co. 7.35c

No. 370—120,000 lbs., 25¼x30¼ ins., Nos. 16, 19, 24 and 31; flat, to trim 25¼x37¼ ins.; min. order, 20,000 lbs.
Mead Board Sales Co. 6.975c

APMEW
AQUABRUSHER PULPER & BEATER
(PATENTED)



CENTRIFUGALLY CLEANS the PAPER STOCK STRONGER AND CLEANER FIBRE PRODUCED

A GOOD INVESTMENT which in many Paper Mills returns its cost TWO TIMES EVERY YEAR.

LET APMEW (70) STANDARDIZED PATENTED PAPER MILL MACHINES PAY YOU WELL for producing BETTER PAPER and for having BETTER BUSINESS, like they are doing for MANY PAPER MILLS...

APMEW, INC.
P. O. Box 1, Glens Falls, N. Y.

QUICK DELIVERIES of ONE WEEK are usual for many APMEW Machines.

NEW LITERATURE

U.S. Government Printing Office. Booklet, "Newsprint." Report of the Subcommittee on Study of Monopoly Power. Covers salient facts and conclusions of Congressional Committee's investigation of the newsprint industry.

Westinghouse Electric Corp. Booklet B-4727. Stresses three ways that better lighting can work for the industrial plant operator. Analyzes the three modern light sources (fluorescent, mercury vapor and incandescent) as to type of light, efficiency, lamp life, main-

tenance, mounting height and job suitability. Illustrated.

American Coal Burner Co. Sales copy. Highlights new boiler room stoker feeder conveyor.

Bristol Co. Bulletin E1111. Announces a line of Series 500 Recording Voltmeters and Ammeters. Describes, features, and emphasizes newly-developed moving-iron measuring mechanism. Includes information for permanent installation and portable use, photographs, charts and actual chart records.

Carpenter Steel Co. Technical data, "Corrosion Notebook." 16 pp. Describes general types of corrosion, intergranular, galvanic, atmospheric and pitt-type.

Casey & Case Coating Co. Brochure. Presents and describes the characteristics, properties, uses and methods of application of synthetic rubber resin based coatings. Covers machinery enamels, scuff-free floor finishes, etc.

Chain Belt Co. of Milwaukee. Bulletin No. 51-7, "Installation, Operation and Maintenance of Chain Drives and Conveyors." Text is concise and illustrated. Bulletin No. 51-27. Introduces new Rex pump line.

Dun & Bradstreet, Inc. Chart, "The U.S. Freight Carrying System, 1940 vs. 1950." Shows the changes in carrying capacity and types of equipment for the various types of carriers.

Factory Management and Maintenance. Book, "Plant Executives Deskbook." Comprehensive guide to basic management practices.

The Flintkote Co. Folder, "Mastic Flooring Underlayments." Describes the composition and mixtures for asphalt emulsion and rubber latex binders and recommended application.

Minneapolis-Honeywell Regulator Co., Brown Instruments Div. Instrumentation Data Sheet No. 2. 9-12a, "Engineered Evaporator Control Boosts Efficiency — of Alkaline and Acid Mill Recovery Plants." Discusses importance of various multiple effect evaporator variables and describes different methods of measuring and controlling them. Specification Sheet No. 175, "Electronik Strip Chart Potentiometer Controller." Instrumentation Data Sheet No. 10.0-5, "Electronik Function Plotter Records, $y = (f)x$." Technical information describing the operation and instrument characteristics.

Prufcoat Laboratories, Inc. Technical Bulletin Sheet, No. 025, "You Spend Less on Aluminum Paint When You Use — Prufcoat Aluminum." Sales copy.

Shenango-Penn Mold Co. Bulletin No. 150, "Shenango Non-Ferrous Centrifugal Castings." Bulletin No. 151. Features parts of Meehanite Metal, Ni-Resist and special iron alloys.

Stonhard Co. Leaflet. Sales copy on "Stonhard Stontop" used in floor surfacing.

Sutherland Refiner Corp. Folder, "Sutherland High Yield Sulphate System." Sales copy. Also folder, "Pressure Washing," a completely new principle applied to washing chemical and semi-chemical pulps.

Titusville Iron Works Co. Bulletin, No. B-3100, "The Ticosteam Generator —A Package Steam Generator." Presents an automatic completely assembled unit—finished, tested, and certified at the factory.

Trico Fuse Mfg. Co. Broadside, "Series 4900." Designed to aid in selecting the proper visible, automatic oiler for constant level, gravity, wick underfeed, multiple and large capacity gravity feed applications. Installation photos.

NEW EQUIPMENT

Digital Reader

The Digital Reader is a new instrument which is expected to eliminate the work involved in recording and computing from strain, pressure, acceleration and temperature gauges, pilot plant and other physical and control instruments used in research work in a number of industrial fields. At present it is often necessary to photograph instrument dials at stated intervals. Research workers must then laboriously jot down the readings in numerical form and arrange them for

ELIXMAN
CORES
CAPS

Straight wound paper cores made in sizes from 2" to 10" inside diameter with any thickness wall required.

Long draw protected slot caps of heavy gauge steel in all standard sizes.

Heavy duty caps with reenforced square hole. This patented feature of reenforcement gives added strength and durability.

Samples of caps or cores will be gladly submitted

ELIXMAN PAPER CORE COMPANY, INC.
CORINTH, N. Y.

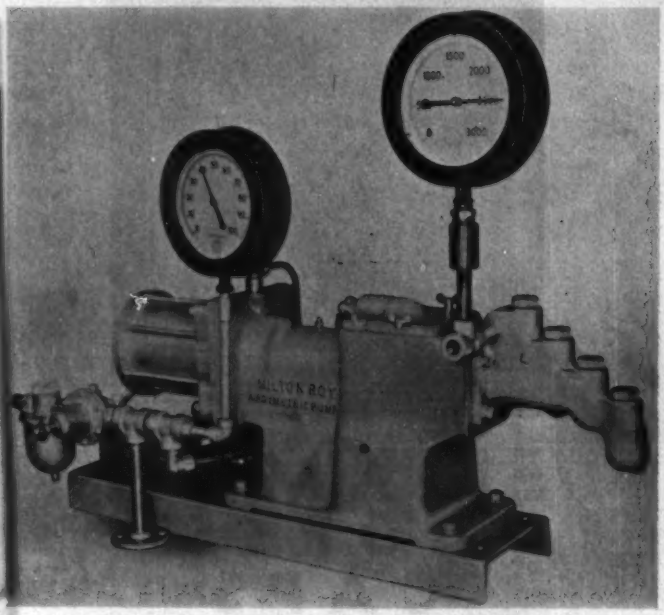
compunation. Some recording instruments trace out a chart which must be similarly carefully examined and translated in numerical form. The Digital Reader, when linked to the instruments to be recorded, rapidly converts the electrical signals it receives from the instruments directly to convenient binary-digital form for immediate analysis, computation, smoothing or storage on recording media, the producer states.

It is a unit about 20" x 30" x 5" operating from 110-125 volts, and is easily incorporated in a variety of multiple instrument reading and recording systems.

Pressure Generator

A new Pressure Generator offers a wide range of pressures and capacities for hydrostatic testing. The unit is combined with a group of specially designed simplified controls to develop test pressures up to 25,000 p.s.i., using ordinary plant air supply in the pump cylinder. Each of the pumps develops a discharge pressure ratio range of at least 6 to 1, permitting single pump use for applications requiring various test pressures. Individual units may be custom made for specific applications between 25 p.s.i. and 25,000 p.s.i.

The Pressure Generator has use in the hydrostatic testing of boilers, forgings, castings, tubing, pipes and piping systems, pressure gages, valves, vacuum pumps, dryers, and high pressure hose, among others. It is used for filling refrigerants and other liquefied gases into bottles or containers. It has application as a booster pump for maintaining required pressures in hydraulic systems. Capacities range from 4 g.p.h. to 405 g.p.h.; pressures from 25 p.s.i. to 25,000 p.s.i. with ordinary plant air supply.



Multipoint Capacilog

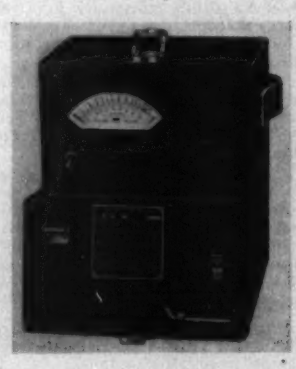
The new electronically operated unit is a deflection type strip chart recorder which provides up to six permanent

records on one chart. Measurement may be obtained with sensing units producing electric signals, such as thermocouples, radiation detectors, etc. This system is a direct reading, nonbalancing method of detecting changes in a measured variable which achieves results heretofore obtainable only through the use of potentiometric or null type systems (accuracy to ¼ of 1 percent of scale), it is stated.

Moisturonic Meter

The new Moisturonic Meter features higher range for broader use. Known as the Moisturonic Moisture Meter, the portable unit features an overall range of 2,000 ohms to 20,000 meg-ohms, a considerably greater span than hitherto available. These factors make it possible for the instrument to check the moisture content of materials heretofore not readily measured. It can be used with any material capable of accommodating electrode proves, it is stated.

Operating on the resistance principle, the meter gives accurate, instant moisture readings directly on wide, clear "double-range" scales. The instrument is available in two forms: one with a scale calibrated for use with lumber, wood, plaster and wood



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Sulphite Converting Specialties

Distributors for Pulp made by:
Consolidated Paper Sales, Ltd.
Montreal, Canada
Laurentide & Port Alfred
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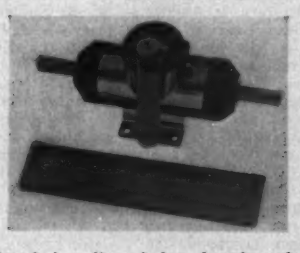
Wayagamack Kraft

products, and the other with linear graduations for use with materials for which no calibrations have been determined.

Lever Adjustment for Miniature Speed Drive

A new miniature variable speed drive with lever type speed control is available. Of the same size and construction as the original type 4A, the new 4B unit has ratings up to 2-pound-inches of torque, 0.025 hp., 20,000 r.p.m., and the ratio is infinitely variable from 1/6 to 6.

The 4B is advantageous in applications requiring remote or automatic control. By applying linkages, or cams, a wide variety of control techniques is possible. The actuating lever carries a pointer which indicates ratio setting on top of the unit. However, remote ratio indication can easily be obtained by means of a scale associated with the remote actuating speed adjuster.



Speed is adjusted by changing the radius at which rollers make contact with discs, and in the case of the type 4B, the rollers are directly turned by the lever control. Thus, lost motion is held to be minimum.

Applications include timers, recorders, controllers, indicating mechanisms, and similar low power devices.

Calibrated Dial

A calibrated dial for use with Leslie Class T and Class M Type Temperature Regulators has been announced. Designed to assure quick, easy and dependable temperature settings, the dial fits in place of standard adjusting sleeve. There are no complicated link-

ages or gages to go out of order or to add friction, it is stated. Easily installed on Class T and Class M Type regulators now in service, the new dial is also said to provide protection against costly overheating caused by guess setting. In addition, the manufacturer states, it is designed for long life under rugged operating conditions such as production line use where frequent readjustments are necessary for process work.

Model Tumble Jar

The new model tumble jar is not only suitable for a wide range of industrial and laboratory applications in mixing, blending, as well as tumbling of small parts and materials, but conforms to specifications of the U. S. Q.M.C. specifications, for dynamic absorption tests on textile coatings. The unit includes a one gallon transparent glass jar having a leak-proof cap lined with tygon, which is almost universally

resistant to corrosion, it is said. The gearhead motor rotates the jar at a speed of 55 r.p.m., but other speeds can be supplied to order. The unit is also available without motor for rotating by hand, and other sizes can be built special.

77 Weightograph Unit

A revolutionary development in automatic scale indication was announced with the introduction of the new 77 Weightograph. A weighing accessory, the unit can be attached to any make of beam scale, or to any scale convertible to beam operation, making an old-fashioned beam scale an "automatic" of the latest type. The unit features a non-protruding periscope with a unique, convenient eye-level screen which instantly flashes the exact weight in large, illuminated, crystal-clear figures for easy, speedy and accurate reading. It is designed with the latest methods of optical projection

which increases image brightness and contrast five times. The image is read off the mirror instead of a ground glass screen, which contributes greatly to the readability of the image under all sorts of light including daylight. The reading line length is 180 inches (15 feet).

AC Part Winding Starter

The new A-C Part Winding Starter, is designed for use with motors which employ two separate parallel windings, star or delta, to obtain increment starting.

It consists of two A-B across-the-line starters and a pneumatic timing

WILLIAMS PRECISION FREENESS TESTER

The Most Accurate Freeness Tester Ever Built

Operates on the Only Correct Principle of Freeness Testing.
Automatic Timing with Electric Stop Clock which Measures Drainage Rate through a Wire, same as on Paper Machine.

For 25 years we have developed and manufactured Pulp and Paper Testing Equipment

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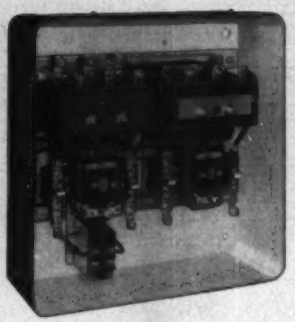
A.S.T.M. Penetration Testers
Electric Centrifuges
Paper Moisture Testers
Smoothness Testers
Laminating and Plastic Moulding Presses

WILLIAMS APPARATUS CO., Inc.

19 Park Place — Watertown, N. Y.

mechanism mounted below one starter and operated by the starter's solenoid plunger. Pressing the "start" button immediately closes the first starter, which energizes one of the two parallel windings. Meanwhile, the timer is in operation and after a few seconds en-



ergizes the second starter. With both starters closed, full line current is supplied to the motor through both windings, each using 50 percent of the total current drawn.

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FOR ALL EQUIPMENT EXPOSED TO CORROSION BY SULPHITE ACIDS OR OTHER CORROSIVE AGENTS
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You have new machinery on order. It takes metal scrap to fill your order.

Steel production will drop unless it gets scrap. Your order may be delayed.

Start Your Scrap Drive Today.

SUPPLIERS

BLACK-CLAWSON CO. has appointed Michael B. Gormley as consultant to the Engineering Departments of Black-Clawson and Shartle Brothers Machine Co.

WARREN STEAM PUMP CO., INC., Warren, Mass., manufacturers of Warren and Warren-Quimby pumping machinery are now represented in up-state New York through a recently opened office of their Pittsburgh representatives, Process Industries Engineers, Inc., Pittsburgh, Pa., who have recently opened an office in 703 Temple Bldg., Rochester 4, N. Y. Mr. J. L. Woll is in charge.

G. D. JENSSEN CO., INC., Watertown, N. Y. has appointed James Brinkley Co., sales engineers, 417 9th Ave., S., Seattle 4, Wash. as Pacific West Coast representatives.

LEEDS & NORTHRUP CO., Philadelphia manufacturers of electrical measuring instruments and automatic controls, have moved the Houston office to 2480 Times Blvd., Houston 5, Texas.

J. O. ROSS ENGINEERING CORP. has received the order for a Machine Hood and Vapor Absorption System for the No. 7 Paper Machine at Northern Paper Mills, Green Bay, Wis. This is the fourth Yankee Dryer to be equipped with Ross systems in this mill. The machine is probably the widest machine of its type in the country.

VALLEY IRON WORKS CO. has elected the following officers: R. A. Peterson, president; Ernst Mahler, vice-president; W. K. Kolb, executive vice-president; D. B. DeNoyer, vice-president in charge of engineering; Paul Boronow, vice-president in charge of sales; W. A. Homes, secretary-treasurer; and Talbot Peterson, assistant secretary.

WYANDOTTE CHEMICALS CORP., Wyandotte, Mich., has recently appointed Henry C. Speel director of the development department.

Mr. Speel will direct all phases of market development and technical service for Wyandotte Chemicals' new organic products.

"DRUPA" MACHINERY EXPOSITION

European manufacturers of machinery for the printing and paper industries have done an excellent job of designing and building for continental markets, according to W. R. Spiller, chief engineer of the Harris-Seybold Co. Mr. Spiller returned on June 10 from an inspection tour of the "Drupa," West Germany's answer to Russia's grab of the famed "Burga-Messen," the great pre-war European exhibition of printing machinery and paper making equipment. Held this year in Dusseldorf, the fair was the first large postwar display exclusively devoted to graphic arts machinery from free Germany and other European nations outside "the iron curtain."

Production problems in the great majority of European printing and paper finishing establishments are quite different from those in the United States. Here the emphasis is on speed and a minimum of work stoppages. On the Continent, where forty cents an hour is top pay, work stoppages and low hourly production are not the management headaches that they are in America. Lack of capital seems to be a more pressing problem as far as the European printer is concerned.

European engineers have done a remarkably efficient job of designing to meet these requirements. Most equipment is both small and relatively light in construction, thus saving material costs. Design emphasis is on cheapness and simplicity, with considerable attention being given to appearance on the newer designs. The latter is due, in all probability, to the extreme competition for a limited market. There were, for instance, eleven different cutting machines and six offset presses exhibited by the West Germans alone. At the National Graphic Arts Exposition in Chicago last fall, only four American cutter manufacturers and four American offset press builders showed their equipment to the huge domestic market, which demands fast, trouble-free machinery capable of operating around the clock without shutdowns.

Between 300 and 350 machinery manufacturers, only 40 of whom were not German, exhibited at the "Drupa."

AMERICAN PAPER AND PULP ASSOCIATION'S PAPER PRODUCTION RATIO REPORT

(Production as per cent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

	May 12	May 19	May 26	June 2	June 9
1951	102.3	103.0	103.8	100.1r	104.2
	May 13	**May 20**	**May 27**	**June 3**	**June 10**
1950	97.1	97.3	97.3	92.6	96.4

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	92.6	93.6	96.7	95.4	96.4	97.7	88.3	99.6	96.1	101.0	99.6	91.2	95.8
1951	99.3	101.3	102.3‡	103.1‡	102.5‡								

‡ Preliminary.
r Revised.

COMPARATIVE YEARLY SUMMARIES

	1944	1945	1946	1947	1948	1949	1950	1951
Year to Date	88.6	88.9	100.2	105.5	100.1	88.4	95.5	101.8
Year Average	88.1	89.4	100.1	104.3	96.2	88.6	95.8	

PAPERBOARD OPERATING RATIOS†

	May 12	May 19	May 26	June 2	June 9
1951	104	106	102	100	102
	May 13	**May 20**	**May 27**	**June 3**	**June 10**
1950	93	92	93	83	94

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1950	88	92	91	92	91	94	82	100	96	102	101	93	94
1951	102	105	104	105	104								

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

Note: The chart shows the ratio through December 1950 on the basis of 6-day capacity. Beginning with January 1951 the ratio is shown on the new basis of normal 6- and 7-day capacities. Corresponding weekly and monthly ratios for 1950 on the new basis, shown in the tables above, are somewhat lower.

Paperboard operating ratios continue on the basis of a 6-day week.

† Per cents of operation based on "inch-hours" reported to the National Paperboard Association.

This in itself is an indication of the extent of the recovery of the German capital goods industry.

The show was well dressed and very impressive and in all probability will grow in both size and importance as consumer demands and changing market conditions force the development of production equipment as we know it.

FINANCIAL

Price Brothers & Co., Ltd., has declared a dividend of 75c on common, payable August 1 to stockholders of record July 16.

Anglo-Canadian Pulp and Paper Mills, Ltd., have declared a dividend of 45c, payable July 2 to stockholders of record June 15.

St. Lawrence Paper Mills, Ltd., has declared a dividend of $1.50 on first preferred stock and another of 60c on second preferred, both payable July 12 to stockholders of record July 3.

St. Lawrence Corp., Ltd., has declared a dividend of 50c on first preferred and 18¾c on second, both payable July 12 to stockholders of record July 3.

N. E. TAPPI ELECTS

Officers elected to serve New England TAPPI for the 1951-52 season are: Chairman, Dr. H. W. Knudson, Hollingsworth & Vose Co., E. Walpole, Mass.; Vice-Chairman, F. S. Klein, Byron Weston Co., Dalton, Mass.; Treasurer, H. T. Barker, Bird & Son, Inc., E. Walpole, Mass.; Secretary, A. G. Dreis, Hercules Powder Co., Holyoke, Mass.

Executive Committee: Helen U. Kiely, American Writing Paper Corp., Holyoke, Mass.; Gordon Benson, St. Regis Paper Co., E. Pepperell, Mass.; S. J. Quattrocchi, Deerfield Glassine Co., Monroe Bridge, Mass.; W. C. Hunter, New Haven Pulp & Board Co., New Haven, Conn.; C. J. Backus, Whiting & Co., Holyoke, Mass.; J. T. Loomer, Robert Gair Co., Inc., New London, Conn.; George Soyka, Ft. Orange Paper Co., Castleton-on-Hudson, N. Y.; C. I. Horton, R. T. Vanderbilt Co., Inc., Norwalk, Conn.

OBITUARIES

Louis Bloch, Chairman of the Board of Crown Zellerbach Corp. passed away in San Francisco on June 12th. Mr. Bloch was one of the pioneers in the B. C. pulp and paper industry and was largely responsible for the growth of Crown Zellerbach's Canadian Subsidiary, Pacific Mills Ltd. He first visited the millsite at Ocean Falls in 1912 and until the time of his death, had taken an active interest in the direction of the affairs of that Company.

John M. Hopwood, 67, of Pittsburgh, chairman of the board of the Hagan Corp. and its subsidiaries, died June 8, at Vero Beach, Fla. Other companies of which Mr. Hopwood was head and co-founder were Hall Laboratories, Inc., Calgon, Inc., and the Buromin Co.

Lester M. Kahn, 62, eastern sales and service manager of the Hammond Bag and Paper Co. of Wellsburg, W. Va., died May 31 in Philadelphia. Before joining the Hammond firm, Mr. Kahn was sales manager of the Adams Paper Bag Co., Cleveland, Ohio.

Charles Gillingham Moore, 75, a founder of the Buffalo Corrugated Container Co., Buffalo, N. Y., died June 1 in his winter home in Coral Gables, Fla. He became interested in corrugated containers soon after coming to Buffalo and was active in the Buffalo Corrugated Containers Co. 41 years. He was secretary-treasurer of the company at the time of his death.

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SPECIALISTS IN PLACING PULP AND PAPER MILL EXECUTIVES

J-22

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Opportunity to join well known established machinery firm. Technical ability and paper making background necessary. Knowledge of beating and pulping process and equipment desirable. Some sales experience or sales inclination helpful. Must be able to travel in territory. Tell us about yourself in your letter. Address Box 51-301 care Paper Trade Journal. TF

PLANT ENGINEER—Bldg. Materials and Plastic Floor-covering Manufacturer, new large-scale New Jersey plant. Applicants must have minimum 6 years plant experience in maintenance, operations and design. Must be familiar with wide variety of process plant equipment and utilities systems. Must be college graduate engineer. Please submit resume with reply. Box No. 51-290, care Paper Trade Journal. A-3

ENGINEERING DRAFTSMEN OR MACHINE DESIGNERS

Experienced in paper and pulp mill or heavy machinery. Permanent position. When replying give qualifications and salary desired.

THE APPLETON MACHINE COMPANY
Appleton, Wisconsin

J-22

WANTED—Experienced Supervisor to take charge of wood yard. In reply, state qualifications and previous employer. Salaried position. Mid-Western Mill. Address Box 51-276 care Paper Trade Journal. J-22

WORKING SUPERINTENDENT for small, fast growing Eastern mill making lightweight specialties. Cylinder machine experience essential. State qualifications and salary expected. Address Box 51-87 care Paper Trade Journal. TF

HELP WANTED

WHAT A JOB!

Mill Manager—Folding Cartons

Ours is a one machine mill located in the midwest, modern in every respect and producing upward of 100 tons per day of the finer grade of folding boxboard.

We are seeking the services of an experienced man in this field who is a real executive, who knows how to handle labor and who is looking for extremely high compensation for the proper performance of his duties.

We suggest that you write us in confidence giving full details as to your past experience and personal qualifications.

Our organization knows of this advertisement.

Address Box #51-320 care Paper Trade Journal. J-22

WANTED

MASTER MECHANIC for progressive board mill. Good salary, good working conditions. Address Box 51-307 care Paper Trade Journal. J-29

SALARIED POSITIONS $3,500 to $35,000. We offer the original personal employment service (established 41 years). Procedure of highest ethical standards is individualized to your personal requirements. Identity covered; present position protected. Ask for particulars. R. W. BIXBY, INC. —117 Dun Bldg., Buffalo, 2, N. Y. TF

WANTED—Two experienced Machine Tenders; Two experienced Back Tenders; Two experienced third hands. Opportunity for back tenders to quality for machinetenders. Specialty Kraft Mill. Middle West. Fourdrinier machines. Steady employment. Good wages. Address Box 51-277 care Paper Trade Journal. J-22

PROJECT ENGINEER—CALIFORNIA. 5 years experience. Processes and machinery for manufacture of floor coverings, wallboards, insulations, building materials. Permanent position. Salary open. Moving expenses allowance. PABCO PRODUCTS INC., 1350 Powell Street, Emeryville, California. Jy-13

WANTED — Machine Tenders and Back Tenders for corrugating medium and liner mill. Fourdinier and cylinder machines. Located in Western Pennsylvania; good working conditions; pleasant surroundings and very good labor relations. Call collect—Tarentum 1470, TARENTUM PRODUCTS CORPORATION, Tarentum, Pa. TF

MID-WESTERN FOURDRINIER SPECIALTY MILL has opening for experienced Production Superintendent. References required. Address Box 51-278 care Paper Trade Journal. A-31

HELP WANTED

WANTED — EXPERIENCED, COMPETENT PURCHASING AGENT for an eastern chipboard mill. Must be capable and fully experienced. Furnish details of experience, capabilities and references. Excellent opportunity. Address Box 51-153 care Paper Trade Journal. TF

WANTED — TOP GRADE SALESMANAGER for an eastern chipboard mill. Fully experienced and capable. Furnish details of experience, capabilities and references. Excellent opportunity. Address Box 51-78 care Paper Trade Journal. TF

WANTED—Experienced Trimmer Man to operate Seybold Trimmer. Please state age, experience and when available in first letter to FLOWER CITY TISSUE MILLS CO., 700 Driving Park Avenue, Rochester, 13, N. Y. J-29

PRODUCTION SUPERVISOR—For Eastern Wax Paper Manufacturer familiar with all operations. State qualifications, age, salary. Confidential. Address Box 51-289 care Paper Trade Journal. J-29

THIRD HANDS, Back Tenders and Machine Tenders. Immediate openings. Cylinder type machines. Phone Albany 5-3511 or write A. P. W. PRODUCTS CO., INC., Bridge Street, Albany, N. Y. TF

SITUATIONS WANTED

SMALL MILL RESEARCH

Specialty paper engineer will develop new or improved products for small mill on royalty basis. Successful sales and production experience. Laboratory equipment supplied. Write Box 51-298 c/o Paper Trade Journal. J-8

PLANT MANAGER—Paper and Board and their conversion; wants challenging opportunity. Highly successful in organization; administration; labor relations and high level production. Presently employed. Address Box 51-63 care Paper Trade Journal. J-30

CHEMIST—Experienced in solving mill problems, supervision of quality control on test liners, boxboards, corrugating medium and specialties. Ability well known in paper industry. Can head a laboratory staff. Willing to start at $4000. Address Box 51-303 care Paper Trade Journal. J-29

MANAGER or GENERAL SUPERINTENDENT—B.S. Degree, twenty four years in supervisory capacity manufacturing fine papers and specialties. Highly successful in organization, labor relations, maintenance, installation. Maximum production and quality at minimum cost. Motto—"It can be done." Excellent references. Address Box 51-313 care Paper Trade Journal. J-6

FOR SALE

FOR SALE—65" Seybold Paper Cutter; 36" Slitter & Rewinder, 40" Sheeter with Layboy; 30" Waldron 6-color Wall Paper Printing Press; 29 x 40 Thomson Platen Die Cutter; 6" Brightwood Box Machine. Address Box 51-217 care Paper Trade Journal. TF

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Address replies to advertisements appearing under Box Numbers in care of PAPER TRADE JOURNAL, 11 West 42th Street, New York 18, N. Y.

FOR SALE

FOR SALE

100—Black & Clawson Dryers tested for 150# Hydrostatic pressure 48" dia., 46" face 8" dia. journals nickel plated surface. Complete with gears and bearings. These dryers are in perfect condition. Shipment within 30 days.

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J-22

MACHINE COATED BOOK FOR SALE. 13-16" width rolls. Basis 40#. Large quantities. Send replies to Box 51-321 care Paper Trade Journal. J-6

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300 Tons
BLANK NEWS

Available Immediate Delivery

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FOR SALE

FOR SALE

3—Complete Paper Machines. Two Cylinders, One Fourdrinier. The Cylinder Machines will make 25 to 30 tons each. The Fourdrinier will make approximately 15 tons designed for speed 250 to 300 F.P.M. Fully rebuilt and guaranteed.

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FOR SALE—1—122" Heavy Duty Single Knife Horne Cutter, suitable for Board or Pulp. Address Box 51-275 care Paper Trade Journal. TF

ROSS PAPER MACHINERY CO.

MACHINERY WANTED FOR OUTRIGHT PURCHASE

Paper Machines, Pulp and Paper Mill Machinery and Converting Equipment.

BEATERS
2—Dilts 700 lb. Iron Tub. Roll 44" face x 26" diameter.
1—Downingtown 1000 lb. Iron Tub. New roll 60" face x 48" diameter.
1—Downingtown 1500 lb. Iron Tub with 75 HP. motor.

BELTING—NEW
25 feet 5" 15 ply Goodyear Rubber Belting.
1 foot 8½" 4 ply Silver Duck Transmission belt.

CALENDER ROLLS
48 Chilled Iron Rolls—Assorted sizes.

CALENDER STACKS
1—5 roll—62".
1—7 roll—42". "All rolls bored for steam.
1—Lobdell 5 roll 124" Calender Stack, with doctors and drives.
1—Farrel Birmingham 110" Calender Stack with doctors. 3 rolls bored for steam.

COMBINING MACHINE
1—Black Clawson 54" Combining Washing with 4—48" diameter and 1—54" diameter Dryers. Motor, pumps, tanks, etc. Complete.

CONVEYOR
1—45½ ft. long x 20" wide—with motor.

CORE CUTTERS
1—Cameron with 2" x 1½" mandrels.

CYLINDER MOLDS
1—134" face x 36" diameter, with stainless steel shafts.

DRIVES—ENCLOSED HERRING BONE GEAR
2—Falk right angle 75 hp—ratio 4.31-1.
2—Falk straight 200 hp—ratio 1.67-1.
1—Falk straight 150 hp—ratio 5.12-1.

DRYERS
3—124" face x 60" diameter.
1—77" face x 48" diameter—with gear.
1—120" face x 10" diameter—Suby Dryer.
1—60" face x 36" diameter.
1—102" face x 48" diameter, with bearings.
2—100" face x 48" diameter—with gears and bearings.
3—110" face x 45" diameter with bearings and gears.
1—117" face x 48" diameter.
1—100" face x 42" diameter Creping Dryer.
4—42" face x 36" diameter, with frames, gears and bearings.
19—48" face x 48" diameter, with gears, bearings and steam joints.

EXTRACTOR ROLLS
1—Downingtown Extractor Roll 138" face x 24" diameter. Anti friction bearings.

FILTER PRESS
1—New Sperry filter press, size 12, type 41.

FILTERS
1—Oliver Vacuum Filters. Cylinder 10" face x 119" diameter. Steel vat. 1350 GPM capacity.

FLAT SCREENS
2—8 plate Sandy Hill Roller Shoe with scrapers.
1—Harmon 12 plate.
1—Sandy Hill 12 plate roller shoe.
1—Bagley & Sewall 5 plate, with scrapers and plates.

JORDANS
1—60 Hilard, for motor drive.
1—Jones Hamilton with base and couplings—
1—72 Academy with base and couplings.
1—Jones Majestic, Stainless Steel Fillings.

MOTORS
1—Allis Chalmers 30 h.p. 440 v. 880 r.p.m.
1—Allis Chalmers 30 h.p. 440 v. 865 r.p.m.
30 others 440 v. motors from 2 h.p. to 75 h.p.

PULP EQUIPMENT
1—Mills & Merrill 217 Pulpwood chipper.
1—Bird ball bearing Pulp Screen. Practically new. Used 2 months.
1—IMPCO 60" Ball Bearing Pulp Screen—60 ton capacity.

PULPERS
3—82 Lammys.

PUMPS
44—Centrifugal Pumps, open & closed impeller, Direct connected or Belt Driven. Extended base for motor. Assorted capacities and heads. Most used less than one year. Also new Gould Pumps.

REDUCERS
1—Link Belt 40 h.p. Ratio 2.3-1, 880 r.p.m.-227 r.p.m.

ROLLS—PRESS, COUCH, etc.
22—Press rolls, brass and rubber covered.
14—Couch rolls, brass and rubber covered.
324—Brass and steel carrying rolls.

ROTARY SCREENS
4—42A Bird, fully rebuilt with new wire, plates, etc.—enclosed drive.
1—22 Bird—stainless steel wet.

SAVEALLS
2—Oliver, Vacuum type, cylinder 120" face x 60" diameter, with steel vat.

SCREW PRESSES
1—Valley Voith Screw Press Size 2.

SHEETERS
1—48" Kidder Reel Sheeter.
1—64" Duplex Dilboy with 15 roll Reel Stand.

SHOWERS
3—Broughton Oscillating Showers for 119" machine.

SHREDDERS
1—American 27" Hammermill, anti-friction bearings.
1—Lehey 28½" Haines—7 knife rotor—6 knife bed plate. Ball bearing.

SLITTERS AND WINDERS
1—Beloit 120" Paper Machine Slitter and Winder—40" rewind.
1—Hudson Sharp 60" Wax roll slitter and rewinder.
1—Langston 40" sheet cut with motor and 20 sets of slitters.

STEAM TURBINES
1—De Laval 220 h.p. initial pressure 140 p.s.i. Exhaust pressure 35 p.s.i. Complete with gear reducer.
1—De Laval Variable speed—875 h.p. at 133 r.p.m. and 30 p.s.i. exhaust. Complete with gear reducer.

STOCK PUMPS
1—Gaurin 10 x 20 Single Plunger Pump.

STOCK REGULATORS
2—Merritt Stock Regulators.

SUCTION PRESS ROLLS
1—Sardusky 57" drilled face x 16" diameter.

THICKENER
1—Woods Thickener with anti friction bearing. Cylinder 40" diameter x 120" face.

TOILET TISSUE PERFORATOR
1—Paper Converting Machine Co. automatic 81" Perforator, slitter and Winder—with three motors—ball bearing.

TRIMMER
1—67" Seybold with motor and 7 knives.

VACUUM PUMPS
1—Nash H-5 Vacuum Pumps

WATER FIRING UNIT
1—Valley Stereotel Unit for water finish on paper—120" double.

WAXING MACHINES
1—64" Peterie complete from 1st off to single roll rewind section.
1—60" Sandy—complete from 2 roll 1st off to single roll rewind.

WHY LIST YOUR EQUIPMENT? — WE WILL BUY IT.

FOR SALE

Cameron Slitters

1—52" Type 6-S.
1—32" Type 40-2A.
1—42" Type 40-1-AF.
1—42" Type 26-2A.

OTHER SLITTERS

1—64" Langston Type B.—Rewinds 50" diameter rolls.
1—52" Knowlton Combined Slitter and Rewinder and Rotary Sheet Cutter.
1—60" Hammermill Score Cut.
1—48" Kidder Model SL Shear Cut.
1—50" & 1—40" Langston Type A Shear Cut S & R.
1—42" Langston Center Wind Duplex Shear Cut Slitter and Rewinder.
1—39" Fales Model B.
1—32" Hobbs Shear Cut, double rewind slitter and rewinder.

POWER PAPER CUTTERS

12—Seybold, 1—74", 10ZD, 20th Century, 44", 54" & 64" & 74", 1—40" & 1—40" 10Z, 1—40" 6Z, Holyokes, 54", 44", 48" and 54".
3—Oswegos; 38", 44" and 57"; 1—Sheridan, 50"; 1—Dexter, 57"; 2-Acme, 32" and 42"; 1—S&W Under Cut 63".

MISCELLANEOUS MACHINES

1—64" Creping machine, complete with automatic Kohler system.
Several Die Presses, Seybold and Sheridan, various sizes.
1—Hudson-Sharp #4 special Tissue Paper Folder.
Schultz Automatic Wax Paper cutter box roll machine Type AX-103, rewinds rolls up to 125" in length 12" in width.
1—72" x 49" Erie Layboy.
1—Modern Clipper Bag Machine for cellophane and pliofilm materials. Makes flat or gusset bags, single or duplex, range 1½ to 9" in width, 2" to 27" in length.
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1—72" Type A, Hudson-Sharp Automatic collapsing reel.
1—84" Miami lo-type Waxing Machine, manufactured by Dilts Machine Works with 1 refrigerating unit size 4" x 4".
2—Potdevin Waxing Machines, 82" wide.
1—Paper Converting Machine Co.'s Model No. 218, three web, ¼ fold napkin machine with embossing attachment.
1—Dexter Co.'s File Folder Machine.
1—77" Paper Towel Roll Converter.
2—81" Toilet Paper Converters, suitable for standard and facial tissue.
2—Brand new 81" Dietz, very latest type, friction rewind combination toilet and towel roll convertors. Automatic counters and stop motions.
1—64" Dillon Duplex Rotary Sheet Cutter.
1—42" Hobbs Embosser, with Vickers 20 ton hydraulic pressure attachment.
1—45" German Dornbusch Embossing machine with 2 sets of embossing rolls.
1—38" Holyoke Roll to Roll Embosser, Heavy Type. Two extra new rolls, one steel and one paper.
1—45" Robinson Rotary Card Cuter.
1—40 Norwood Plater, AC Reversing Motor Equipment.
1—20" Champlain 4 color Rotogravure Press.
1—116" Model 29 Hamblet Duplex Rotary Sheet Cutter, slitting attachment, Erie automatic layboy and twelve roll backstands.
1—74" Hamblet Duplex Rotary Sheet Cutter, slitting attachment, 8 roll backstands, Moore & White layboy, 15 HP Reliance Drive.
1—55" nine roll Holyoke Super Calender stack with AC motor equipment.
1—40" Holyoke, 6 Roll, Stack of Super Calenders.
1—Staude, "Champion" folding and glueing machine.
1—60" Parry Liner, 11 roll type. New 1949. Never used.
1—74" wide Hudson-Sharp Duplexing machine #298, 3 coating units, including asphalt.

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Telephone Lexington 2-5759
J-22

FOR SALE

FOR SALE

5—42" Moore & White Sheeters, one with Layboy.
48" and 68" Hamblet Sheeters.
38" Finley Sheeter, very reasonable.
100" Dillon Sheeter with 10-roll Back-Stand.
52" Cameron type 8 model 5 Slitter.
62" Cameron 8S Slitter.
42" Cameron 26-2A Slitter, like new.
32" Inman shear cut Slitter.
40" Kidder style GN Slitter, shear cut.
68" Sheridan Auto. Power Cutter.
57" Dexter Power Cutter.
78" 2-drum Upright Reel.
NEW Baling Presses, both hand and power.
NEW Hamblet Sheeters, any size, for any purpose.

THOMAS W. HALL COMPANY, Inc.
120 West 42nd St., New York 18.
(Plant at Stamford, Conn.)
TF

GOOD PAPER MILL EQUIPMENT

42" Cameron 26-2A Slitter, like new.
52" Cameron type 8 model 5 Slitter.
32" Inman shear cut Slitter.
42" Moore & White Sheeter with layboy.
48" Hamblet Sheeter.
58" Finley Sheeter, very reasonable.
92" Hamblet Sheeter with M & W Layboy.
100" Dillon Sheeter with 10-roll Back-Stand.
68" Oswego mill type Power Cutter.
74" Seybold 10Z Auto. Power Cutter.
57" Brown & Carver Power Cutter.
78" Paper Reel.
Silver #215 Paper Shredder.
NEW "Famous" Balers, both hand & power.
NEW Hamblet Sheeters, any size.

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Four 3A - 100" Bird Screens non-ferrous construction with 24 cut bronze screen plates, front end skimming boxes, copper dam, high pressure cleaning showers and 440 volt, 3 phase, 60 cycle motors. In operation approximately two years. In excellent condition. Contact Weyerhaeuser Timber Company, Purchasing Department, P. O. Box 275, Springfield, Oregon.
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FOR SALE

1—Duplex cutter, 108" knife, complete with layboy and backstands.
1—2½" Acme steel bed forging machine, serial #M5581, complete with motor.
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82" POTDEVIN SQUEEZE ROLL WAXING MACHINE,
V-Belt drive and 15 H.P. General Electric motor equipment A1 condition. Immediate Delivery. Address Box 51-314 care Paper Trade Journal. J-22

PAPER COATING MACHINERY MANUFACTURERS — Waxing, Oiling, Carbon Laboratory Coating and Treating and Flat Ream Measuring and Converting Machines. New improvements. THE MAYER MACHINE COMPANY, INC., 1313 Buffalo Road, Rochester, 11, N. Y. TF

FOR SALE

For Sale: Very valuable asphalt laminating and coating machine 74" wide all electrical equipment. Immediately available. Rare opportunity. For inspection address or phone: Theo. Adams, 111 W. Washington, Randolph 6-4918. J-39

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FOR SALE—175 HP Corliss Steam Engine with paper machine line shaft and pulleys. Address Box 51-326 care Paper Trade Journal. J-29

FOR SALE—250 HP 13" x 16" Erie City Twin Tangye Steam Engine. Address Box 51-324 care Paper Trade Journal. J-29

FOR SALE—6 Buffalo Stainless Steel Pumps Type—6" CM#316 Stainless Steel R.P.M. 1150, 575 G.P.M. at 40' head, 10 HP motor. Will handle 3¼% consistency. Address Box 51-325 care Paper Trade Journal. J-22

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Used Slitter & Rewinder Wanted

about 72".
Cameron preferred
State full details
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JORDANS
BY PAPER MANUFACTURER
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4—400 amp. Oil Circuit Breakers similar to Westinghouse Model F-13A5. Must have interruption capacity of 50,000 K.V.A., complete with instantaneous trip and indicating ammeter for 3 phase 2500 volt circuits.
6—S. A. Dixon fuse disconnects for 2500 volts—400 amp.
1—1600 ampere blade disconnect for 3 phase 2500 volt circuit.
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Serviceable Grocery Bag Machine
6 through 20 lb. sizes.
Recent Model Potdevin preferred.
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SMALL PAPER MILL

In East desired as permanent investment. Plant consuming chemical pulps preferred.
Write Box 51-287 c/o Paper Trade Journal. J-39

WANTED—Brightwood Box Machine, Shredders, Evaporators, Generators and Boilers, Slitters, Cutters, Hydraulic presses, Sheridan Presses, Dryers. Address Box 51-88 care Paper Trade Journal. TF

WANTED

WANTED—W & P Shredders, Evaporators, Generators and Boilers, Slitters, Cutters Hydraulic presses, Sheridan Presses, Dryers. Address Box 51-89 care Paper Trade Journal. TF

WILL EXCHANGE #6 Camachine 62" Shear Cut for a #6 Camachine Score Cut. Address Box 467, Camden, N. J. J-22

WANTED

WANTED—A good used combination slitter and rewinder, score cutting, 72" to 76" wide to rewind 30" plus. Address Box 51-305 care Paper Trade Journal. J-6

WANTED—Small Tissue Mill in the East. Address Box 51-300 care Paper Trade Journal. J-6

WANTED

WANTED—Dryers for Paper Machine about 90" to 100"; also, Flat Cutter; Sheeter. Address Box 51-282 care Paper Trade Journal. J-22

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BRUSHES
M. W. Jenkins Sons, Inc.
Gus Reidel & Son
The Sandy Hill Iron & Brass Works
Smith Winchester Mfg. Co.
Weber, Herman G., & Co., Inc.

BURSTING TESTERS
B. F. Perkins & Son Inc.
Testing Machines, Inc.

CALENDERS
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Downingtown Mfg. Co.
Farrel-Birmingham Co., Inc.
Lobdell United Co.
Edward J. McBride
The Moore & White Co.
Perkins & Sons, Inc., B. F.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Waldron Corp., John

CARRIER ROPE
Williams-Gray Co.

CASEIN
American Cyanamid Co. Industrial Chem. Div.
Bunge Pulp & Paper Co.
Hercules Powder Co.

CASTINGS
Appleton Machine Co.
The Bagley & Sewall Company
Black Clawson Company
Babcock & Wilcox Co.
Carthage Machine Co.
Dilts Machine Works
Downingtown Mfg. Co.
Farrel-Birmingham Co.
Hamblett Machine Co.
Lobdell United Co.
Magnus Metal Corp.
Michigan Steel Casting Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Walworth Company

CENTRIFUGAL MACHINERY
Bird Machine Co.
Nichols Engrg. & Research Corp.
Ross, J. O., Engrg. Co.
Shartle Brothers Machine Co.

CHAINS
Stephens-Adamson Mfg. Co.

CHEMICAL COTTON PULP
Hercules Powder Co.

CHEMICALS
American Cyanamid Co., Industrial Chems. Div.
Ansul Chemical Co.
Bunge Pulp & Paper Co.
Calco Chemical Co.
Calcon, Inc.
Diamond Alkali Co.
Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuffs Corp.
Geigy Co., Inc.
B. F. Goodrich Chemical Co.
Gottesman & Co.
Hercules Powder Co.
Hooker Electrochemical Co.
The Kinsley Chemical Company
Monsanto Chemical Company
National Aluminate Corp.
Naugatuck Chemical Division of U. S. Rubber Co.
Niagara Alkali Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co., Columbia Chemical Division
Reichhold Chemicals, Inc.
Rohm & Haas Co.
Virginia Smelting Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

CHESTS
The Bagley & Sewall Company
E. D. Jones & Sons Co.
Kalamazoo Tank & Silo Co.
Shartle Bros. Mch. Co.

CLEANING MATERIALS
American Cyanamid Company, Industrial Chemicals Division
The Dow Chemical Company
E. I. du Pont de Nemours & Co., Inc.
General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Pittsburgh Plate Glass Co
Wyandotte Chemicals Corp., J. B. Ford Division

CLUTCHES
Appleton Machine Co.
The Bagley & Sewall Company
Black Clawson Company
Farrel-Birmingham Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.

COATING MACHINERY
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
The Mayer Machine Co., Inc.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corporation, John
Weber, Herman G., & Co., Inc.

COATING MATERIALS
American Cyanamid Company, Industrial Chemicals Division
E. I. Du Pont De Nemours & Co., Inc.
B. F. Goodrich Chemical Co.
The Goodyear Tire & Rubber Company
Hercules Powder Co.
J. M. Huber Corp.
Monsanto Chemical Company
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.
Plaskon Division, Libbey-Owens-Ford Glass Co.
Reichhold Chemicals, Inc.
Wyandotte Chemicals Corp., Michigan Alkali Div.

COGS
The N. P. Bourdon Co.

COMPLETE FOURDRINIER ROLL GRINDING
Manchester Machine Co.

COMPRESSORS
Allis-Chalmers Mfg. Co.
Nash Engineering Co.
Roots-Connersville Blower Corp

CONDENSATE FILTERS
Hungerford & Terry, Inc.
The Permutit Company

CONSISTENCY REGULATORS
Askania Regulator Co.
Bird Machine Company
DeZurik Shower Company
Paper & Industrial Appliances

CONSTRUCTION CONTRACTORS
C. M. Guest & Sons

CONSULTING ENGINEERS
Kirk, F. Paul
Black Clawson Company
Dilts Machine Works
Ebasco Services
Frank W. Egan & Co.
Alvin H. Johnson & Co., Inc.
Main, Inc., Chas. T.
The Rust Engrg. Co.
Shartle Bros. Mch. Co.
J. E. Sirrine & Co.
Frank C. Vaughan
John Waldron Corp.
H. G. Weber & Co., Inc.

CONTINUOUS DIGESTER
Paper & Industrial Appliances

CONTROLLERS
Black Clawson Company
The Brown Instrument Co.

CONTROLS
The Brown Instrument Co.
Johnson Corp.
Poirier Control Co.
Shartle Bros. Mch. Co.
Stickle Steam Specialties Co.

CONVERTING MACHINERY
The Bagley & Sewall Company
Egan, Frank W., & Co.
John Waldron Corp.
Dilts Machine Works

CONVEYORS
Black Clawson Company
Murray, D. J., Mfg. Co.
Ross Engineering Corp., J. O
Shartle Brothers Mch. Co.
Stephens-Adamson Mfg. Co.

CORES
Elizabeth Paper Co.
Smith & Winchester Mfg. Co
Sonoco Products Co.

CORROSION RESISTANT
Ampercast Corporation

COTTON LINTER
Alpha Cellulose Corp.
Railway Supply & Mfg. Co.

COTTON PULP
Alpha Cellulose Corp.

COUCH ROLLS
Beloit Iron Works

COUPLINGS
The Bagley & Sewall Company
Black Clawson Company
Farrel-Birmingham Co., Inc.
E. D. Jones & Sons Co.
Lovejoy Flexible Coupling Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works
Waldron Corp., John

CRANES
Cleveland Crane & Engrg. Co
Whiting Corp.

CURL TESTER
Thwing-Albert Instrument Co.

CUTTERS
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Dilts Machine Works
Gibbs-Brower Company, Inc
Graphic Arts International Corp.
Thomas W. Hall Co.
Harris-Seybold Co.
Jagenberg-Werke Akt. Ges.
Moore & White Co.
Perkins & Son, Inc., B. F.
The Sandy Hill Iron & Brass
Taylor, Stiles & Co. Works
The Smith & Winchester Mfg. Co.

CYLINDER MOULDS
Manchester Machine Co

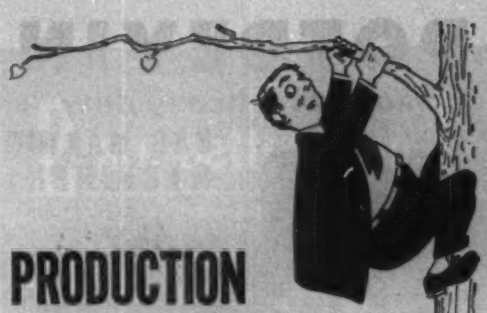
CYLINDERS
M. W. Jenkins Sons, Inc

DAMPENERS
Perkins & Son, Inc., B. F
Valley Iron Works Co.

DECKLE WEBBING
Williams-Gray Co.

DEFIBRATORS
American Defibrator Co

DE-INKING
Dilts Machine Works
General Dyestuff Corp.
Kinsley Chemical Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.



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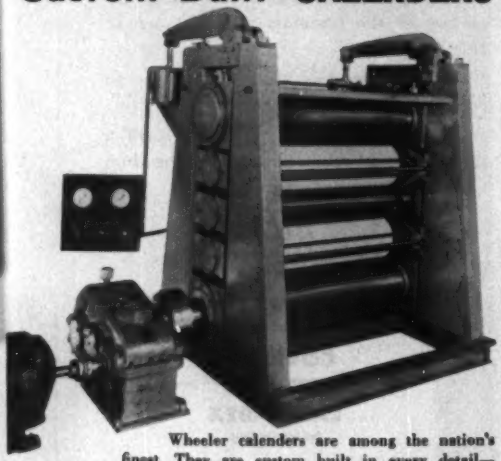

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Kindey Chemical Co.
Nopco Chemical Co.

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The Permutit Company

EMULSIFIERS
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DENSOMETERS
Bunge Pulp & Paper Co.
W. & L. E. Gurley

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Ebasco Services

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General Dyestuff Corp.
Monsanto Chemical Company
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

DEWAXING CHEMICALS
American Cyanamid Company Industrial Chemicals Division
General Dyestuff Corp.
Nopco Chemical Co.

DIFFERENTIAL SCALES
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Blaw Knox Company
Chicago Bridge & Iron Co.
Combustion Engineering-Superheater, Inc.
Lukenweld
Paper & Industrial Appliances
Pusey & Jones Corp.

DISPERSING AGENTS
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General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

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Bird Machine Company
Black Clawson Company
Downingtown Mfg. Co.
Lobdell United Co.
Lodding Engineering Corp.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

DOCTOR BLADES
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Bird Machine Company
Lodding Engrg. Corp.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Simonds Saw & Steel Co.

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Black Clawson Company
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Lukenweld
The Moore & White Co.
Murray Mfg. Co., D. J.
J. J. Ross Company
Red-Ray Mfg. Co., Inc.
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

DRILLED SUCTION COUCH ROLLS
Manchester Machine Co.

DRILLED SUCTION DRUM ROLLS
Manchester Machine Co.

DRIVES
Allis-Chalmers Mfg. Co.
Appleton Machine Co.
The Bagley & Sewall Company
Beloit Iron Works
Bird Machine Co.
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Fairbanks, Morse & Co.
Farrel-Birmingham Co.
General Electric Company
Gibbs-Brower Company, Inc.
Moore & White Co.
Murray, D. J., Mfg. Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

DRUM WINDERS
Manchester Machine Co.

DRYER DRAINAGE
Stickle Steam Specialties Co.

DRYER ROLL PYROMETER
Thwing-Albert Instrument Co.

DUSTERS
Appleton Machine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
M. W. Jenkins Sons, Inc.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
John Waldron Corp.

DUSTING BRUSHES
M. W. Jenkins Sons, Inc.

DYESTUFFS
American Cyanamid Company, Calco Chemical Div.
Bunge Pulp & Paper Co.
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuffs Corp.
National Aniline Division, Allied Chemical & Dye Corp.

ELECTRIC HYGROMETER
Thwing-Albert Instrument Co.

EMBOSSING MACHINES
Dilts Machine Works
Egan, Frank W., & Co.
John Waldron Corp.

EMBOSSING ROLLS
The Appleton Machine Co.
Gibbs-Brower Company, Inc.
Holyoke Machine Co.
Northern Engraving & Mch. Co.
B. F. Perkins & Son, Inc.
John Waldron Corp.
Wheeler Roll Co.

EMULSIFIERS
General Dyestuff Corp.
Nopco Chemical Co.
Rohm & Haas Co.
Wyandotte Chemicals Corp.

ENZYMES
Rohm & Haas Co.
Vanderbilt Co., R. T.

EVAPORATORS
Davis Engrg. Corp.
Goslin-Birmingham Mfg. Co., Inc.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.

EXPANDERS
Mount Hope Machinery Co.

FANS
General Electric Co.
B. F. Perkins & Son, Inc.
Ross Engineering Co., J. O.

FEEDERS
Hoeft Company, Inc.
Merrick Scale Mfg. Co.
The Permutit Company
Stephens-Adamson Mfg. Co.

FELTS
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Draper Bros. Corp.
Huyck & Son, F. C.
Lockport Felt Co.
Morey Paper Mill Supply Co.
Shuler & Benninghofen
Waterbury Felt Co.
Waterbury, H., & Sons Co.
Williams-Gray Co.

FELT CLEANERS
Calgon, Inc.
General Dyestuff Corp.
Nopco Chemical Co.

FELT CONDITIONERS
Bird Machine Co.
The Sandy Hill Iron & Brass Works

FELT GUIDES
Black Clawson Company
Frank W. Egan & Co.
Gilbert & Nash Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FILLERS
American Cyanamid Company, Industrial Chemicals Division
A. M. Meincke & Son, Inc.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

FILTERS
Bird Machine Company
Holyoke Machine Co.
J. M. Huber Corp.
Hungerford & Terry, Inc.
Johnson Corp.
Moore & White Co.
L. O. Rose Engrg. Corp.
The Sandy Hill Iron & Brass Works
Walworth Company

FITTINGS
The Bagley & Sewall Company
Crane Company
Shartle Bros. Mch. Co.
Walworth Company

FLEXIBLE COUPLINGS
Egan, Frank W., & Co.
Lovejoy Flexible Coupling Co.
John Waldron Corp.

FLOORING, GRATING AND TREADS
The Goodyear Tire & Rubber Company
Norton Co.

FLOW BOXES, STAINLESS-CLAD
Lukens Steel Co.
The Sandy Hill Iron & Brass Works

FORK LIFT TRUCKS
Clark Equipment Company Industrial Truck Division
Elwell Parker Elec. Co.
Towmotor Corp.

FORMATION TESTERS
Thwing-Albert Instrument Co.
Williams Apparatus Co., Inc.

FOURDRINIERS
Beloit Iron Works
Black Clawson Company
Downingtown Mfg. Co.
The Moore & White Co.
Noble & Wood Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

FREENESS TESTERS
Testing Machines, Inc.
Williams Apparatus Co.

FURNACES
Hoeft Company, Inc.

GASKETS
The Goodyear Tire & Rubber Company

GEARS
The Bagley & Sewall Company
Black Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.
Western Gear Works

GRAPPLES
Blaw-Knox Company

GRAVITY FILTERS
Holyoke Machine Co.

GRINDERS
Carthage Machine Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Lobdell United Co.
Norton Company
Samuel C. Rogers and Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
Norton Company
Simonds Abrasive Co.

GUIDES
The Bagley & Sewall Company
Egan, Frank W., & Co.
Gilbert & Nash Co.
The Moore & White Co.
Mount Hope Machinery Co.
John Waldron Corp.

GUMMING MACHINES
Dilts Machine Works
Egan, Frank W., & Co.
The Sandy Hill Iron & Brass Works

GUMS
National Starch Products, Inc.
Stein-Hall Co., Inc.

HEAT EXCHANGERS AND RECOVERY SYSTEMS
Foxboro Company
Griscom-Russell Co.
Heil Co.
Heine Boiler Co.
Ingersoll-Rand Co.
Kennedy Van Saun Mfg. & Engrg. Corp.
Leslie Co.
Nash Engineering Co.
Riley Stoker Corp.
Schutte & Koerting Co.
Sterling Boiler & Utility Co.
Struthers-Wells Corp.
Taylor Instrument Companies
Vogt Machine Co., Henry
Worthington Corp.

HEATING, VENTILATING & AIR CONDITIONING
The Appleton Machine Co.
E. D. Jones & Sons Co.
General Electric Co.
D. J. Murray Mfg. Co.
Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O.
Schutte Steam Specialties Co.
Valley Iron Works Co.

HOSE (Air, Water, Suction, etc.)
The Goodyear Tire & Rubber Company

HUMECTANTS
Akrivin Division, Heyden Chemical Corp.
Hopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

IMPREGNANTS
American Cyanamid Company Industrial Chemicals Division
B. F. Goodrich Chemical Co.

INDENTING MACHINES
Dilts Machine Works

INDUSTRIAL TRACTORS
Clark Equipment Company Industrial Truck Division
Towmotor Corp.

INKOMETER
Thwing-Albert Instrument Co.

INSTRUMENTS, TESTING AND MEASURING
Brown Instrument Co.
Bunge Pulp & Paper Co.
Cambridge Instrument Co.
General Electric Company
W. & L. E. Gurley
B. F. Perkins & Son
Photovolt Corp.
Taylor Instrument Cos.
Testing Machines, Inc.
Thwing-Albert Instrument Co
Williams Apparatus Co.

JOINTS
The Bagley & Sewall Company
Beloit Iron Works
Johnson Corp.
Lovejoy Flexible Coupling Co.
Shartle Bros. Mch. Co.

JORDAN FILLINGS
Appleton Machine Co.
Baker Brothers Mfg. Co.
E. D. Jones & Sons Co.
Shartle Bros. Mch. Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KNIVES
Black Clawson Company
Dilts Machine Works, Inc.
Hamblet Machine Co.
Hoppenstall Company
E. D. Jones & Sons Co.
The Moore & White Co.
Simonds Saw & Steel Co.
Taylor Stiles & Co.
Valley Iron Works Co.

KRAFT WRAPPING PAPERS
Canadian Newsprint Supply Co.

LABORATORY CORRUGATOR
Thwing-Albert Instrument Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
Bird Machine Company
Dilts Machine Works
W. & L. E. Gurley
Egan, Frank W., & Co.
E. D. Jones & Sons Co.
Taylor Instrument Companies
Testing Machines, Inc.
Valley Iron Works Co.
John Waldron Corp.
Williams Apparatus Co., Inc.

LAMINATING MACHINES
The Bagley & Sewall Company
Dilts Machine Works
Egan, Frank W., & Co.
John Waldron Corp.

LAY BOYS
Dilts Machine Works
Gibbs-Brower Company, Inc.
Hamblet Machine Co.
Moore & White Co.

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Alpha Cellulose Corp.
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- The packing box is extra deep, is adjustable and provided with specialized lubricated packings and special type gland and compression bolts.
- The yoke mountings are such that yokes for various methods of gate operation are interchangeable.
- Replaceable gate edge shoes are used in valves 10" and larger. These shoes are of special value when valves are installed stem and pipe horizontal.

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Dilts Machine Works
Shartle Bros. Mch. Co.
Stephens-Adamson Mfg. Co.
The Wellman Engrg. Co.

MICROMETERS & CALIPERS
Farrel-Birmingham Co.
Lobdell Co.
Stephens-Adamson Mfg. Co.
Testing Machines, Inc.

MICRO-CRYSTALLINE WAXES
Bareco Oil Co.
Bunge Pulp & Paper Co.
Moore & Munger
Sun Oil Company

MOISTURE CONTENT CONTROL
Cambridge Instrument Co.
Sickle Steam Specialties Co.
Williams Apparatus Co., Inc.

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Fairbanks, Morse & Co.
General Electric Company
Reliance Electric & Engrg. Co

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Canadian Newsprint Supply Co

NICKEL AND NICKEL ALLOYS
The International Nickel Co.

NOZZLES
Spray Engrg. Co.

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Industrial Truck Division
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The Moore & White Co.
Shartle Brothers Machine Co.

PALLET TRUCKS
Clark Equipment Company
Industrial Truck Division

PAPER MACHINE DRIVES
The Bagley & Sewall Company
Manchester Machine Co.

PAPER MACHINES
The Bagley & Sewall Company
Beloit Iron Works
Bagley & Sewall Co.
Black Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc
Thomas W. Hall Co.
Lakeswield
Moore & White Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black Clawson Company
E. D. Jones & Sons Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPER TUBE MACHINERY
Dietz Machine Works
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson Sharp Machine Co.
Jagenberg-Werke Akt. Ges.
Langston Co., Samuel M.

PARAFFINE WAXES
Moore & Munger
Sun Oil Company

PARAFFIN WAX EMULSIONS
Nopco Chemical Co.

PASTING MACHINES
Beloit Iron Works
Black Clawson Company
Dilts Machine Wks.
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

PEBBLE MILLS
F. L. Smidth & Co.

PERFORATED METAL
Allis-Chalmers Mfg. Co.

pH METERS
Cambridge Instrument Co.
Twing-Albert Instrument Co

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Armco Drainage & Metal Products, Inc.
Babcock & Wilcox Co.
Crane Company
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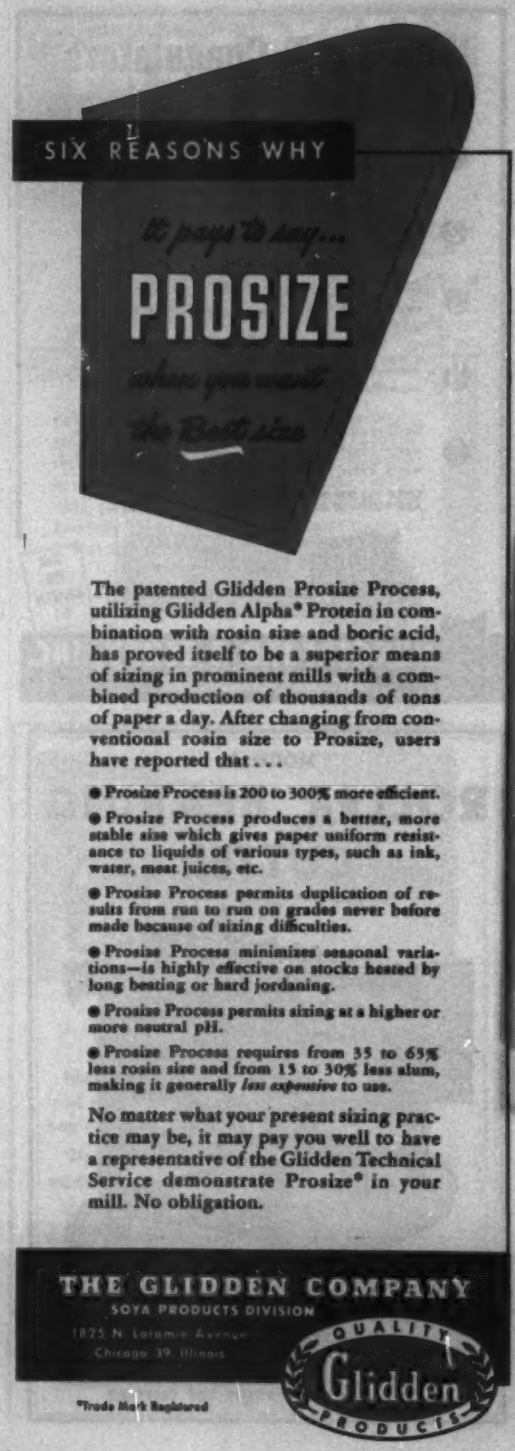

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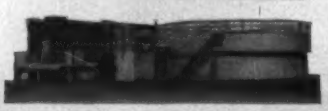

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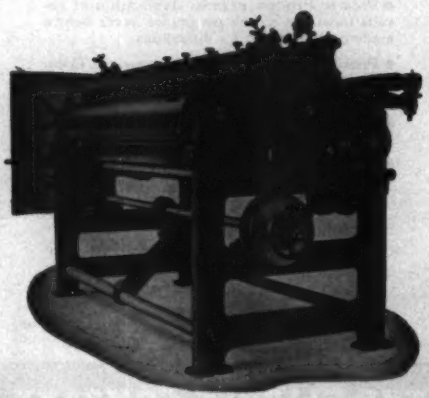

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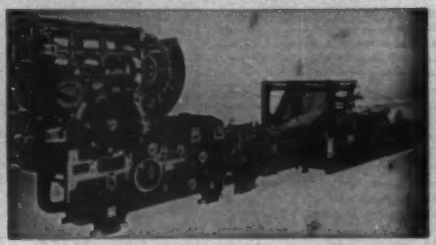

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Duriron Co., The — —

E

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F

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Fitchburg Screen Plate Co. — —

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Goodyear Tire & Rubber Co. — —
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Gotham Ink & Color Co. — —
Gottesman & Co. — —
Graphic Arts Int. Corp. — —
Grinnell Co., Inc. — —
Gulf Oil Corp. — —
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H

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Heppenstall Co. — —
Hercules Powder Co. — —
Heyden Chemical Co., Aktiva Div. — —
Hoft Co., Inc. — —
Holyoke Machine Co. — —
Hooker Electrochemical Co. — 31
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Hubinger Co., The — —
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I

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International Wire Works — —

J

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Jagenberg-Werke Akt. Ges. — —
Jeffrey Mfg. Co. — —
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Johnson, Alvin H., & Co. — 40
Jones, E. D., & Sons Co. — —

K

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Knox Woolen Co. — —
Koppers Co., Inc. — —

L

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Lockport Felt Co. — —
Lodding Engineering Co. — 45
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Lydden Co. — —
Lynch Corp. — —

M

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Marietta Concrete Corp. — —
McBride, Edward T., Company — —
Mead Sales Co., The — 17
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Merrick Scale Co. — —
Michigan Steel Casting Co. — 40
Mixing Equipment Co. — —
Monsanto Chemical Co. — —
Montague Machine Co. — —
Moore & Munger Co. — —
Moore & White Co. — —
Moorhead Electrical Machinery Co. — —
Morden Machines Co. — —
Morey Paper Mill Supply Co. — —
Morningstar, Nicol, Inc. — —
Mount Hope Machinery Co. — —
Murray, D. J., Mfg. Co. — —

N

Nash Engineering Co. — —
National Adhesives — —
National Aluminate Corp. — —
National Aniline Div., Allied Chem. & Dye Corp. — —
National Starch Products, Inc. — —
National Tube Co. — —
Naugatuck Chem. Div., U. S. Rubber Co. — —
Niagara Alkali Co. — —
Nichols Engrg. & Research Co. — 25
Nopco Chemical Co. — —
Northern Engraving & Mch. Co. — —
Norton Co. — —

O

Oldbury Electro Chemical Co. — —

P

Paper & Industrial Appliances — —
Parsons & Whittemore — —
Peabody Engrg. Co. — —
Perkins, B. F., & Son Co. — —
Perkins Goodwin Co. — —
Permutit Co., The — —
Photovolt Corp. — —
Pittsburgh Plate Glass Co. — —
Plastkin Div., Libbey-Owens-Ford — —
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Pulp & Paper Trading Co. — 38
Pusey & Jones Corp., The — —

R

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Raymond, Chas. P., Service, Inc. — 42
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Reidel, Gus, & Son — 40
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Research Corp. — —
Restigouche Co., Ltd. — —
Rice Barton Research Corp. — —
Rogers, S. C., & Co. — —
Rohm & Haas Co. — —
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Ross, J. O., Engrg. Corp. — —
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Rust Engineering Co. — —

S

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Shartle Brothers Machine Co. — 6
Shuler & Benninghofen — —
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Sinclair Refining Co. — —
Sirrine, J. E., Co. — —
SKF Industries — —
Smidth, F. L., & Co. — 55
Smith & Winchester Mfg. Co. — —
Socony Vacuum Oil Co. Inc. — —
Sonoco Products Co. — —
Spray Engineering Co. — —
Sprout, Waldron & Co., Inc. — —
Squier Corp., The — —
Stebbins Engrg. & Mfg. — —
Stein, Hall & Co., Inc. — —
Stephens Adamson Mfg. Co. — —
Stickle Steam Specialties Co. — —
Stowe Woodward Inc. — —
Sun Oil Co. — —
Sutherland Refiner Corp. — —
Swenson Evaporator Co. — —

T

Taylor Instrument Co. — —
Taylor Stiles & Co. — —
Tennessee Coal, Iron & R. R. Co. — —
Testing Machines, Inc. — —
Texas Co., The — —
Texas Gulf Sulphur Co. — —
Thwing-Albert Instrument Co. — —
Tide Water Assoc. Oil Co. — —
Timken Roller Bearing Co. — Back Cover
Tissue Converting Corp. — —
Titanium Pigment Corp. — —
Towmotor Corp. — —
Tracerlab, Inc. — —

U

United Carbon Co., Inc. — —
U. S. Rubber Co. — —
U. S. Steel Corp. — —
United States Steel Export Co. — —
United States Steel Supply Co. — —

V

Valley Iron Works Co. — —
Vanderbilt, R. T., Co. — 8
Vaughan, Frank C. — —
Virginia Smelting Co. — —

W

Waldron, John, Corp. — —
Walworth Co. — —
Waterbury Felt Co. — —
Waterbury, H., & Sons Co., Inc. — —
Weber, H. G., & Co., Inc. — 53
Wellman Engineering Co. — —
Western Gear Works — —
Western Precipitation Corp. — —
West Virginia Pulp & Paper Co. — 46
Weyerhaeuser Timber Co. — —
Wheeler Roll Co. — 48
Whiting Corp. — —
Williams Apparatus Co. — 39
Williams Gray Company — —
Worthington Pump & Mach. Corp. — —
Wyandotte Chemicals Corp. — —

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How TIMKEN® bearings help you produce better paper at lower cost

All the paper-producing machines on this page are equipped with Timken® tapered roller bearings—from agitator drives to supercalender.

Timken bearings increase the operating life of these machines by reducing friction and wear to a minimum. They provide for more uniform quality by preserving the original accuracy of the machines. They keep moving parts in positive alignment—even under the toughest radial, thrust and combination loads—and conserve power, too.

Timken bearings reduce downtime for machine repairs. They reduce rejects due to improper gauge of sheets and similar flaws. They permit tighter closures that keep the lubricant off the paper, cut down lubrication requirements. They prolong the life of the machine and normally last as long as the machine itself.

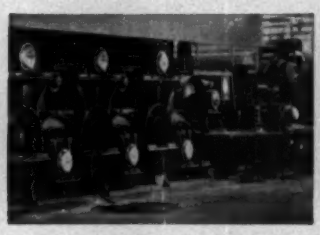
For these good reasons and many more, make sure your machines are Timken bearing equipped. Look for the trade-mark "Timken" on the bearings.

AGITATOR GEARS MESH SMOOTHLY. The drive of this agitator is mounted on Timken bearings. They take the toughest high-density pulp loads, keep gears meshing precisely, reduce wear.

LESS KNIFE BREAKAGE. Timken bearings help these Jordan Engines operate better, with less knife breakage, by keeping the plug in correct alignment and maintaining clearance between plug and shell.

PULPER WORKS STEADY. The gear drive shafts and rotor in this pulper are Timken bearing equipped. Timken bearings permit precision adjustment of the hypoid drive gears and insure 24-hour, trouble-free operation.

WIRES AND FELTS LAST LONGER. Mounting fourdrinier table rolls, wire rolls, felt rolls, press rolls, breast rolls and couch rolls on Timken bearings means longer life for wires and felts, better quality paper.



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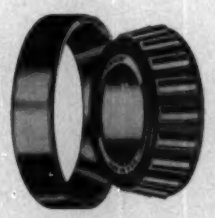

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